GENESIS SOLAR ENERGY PROJECT

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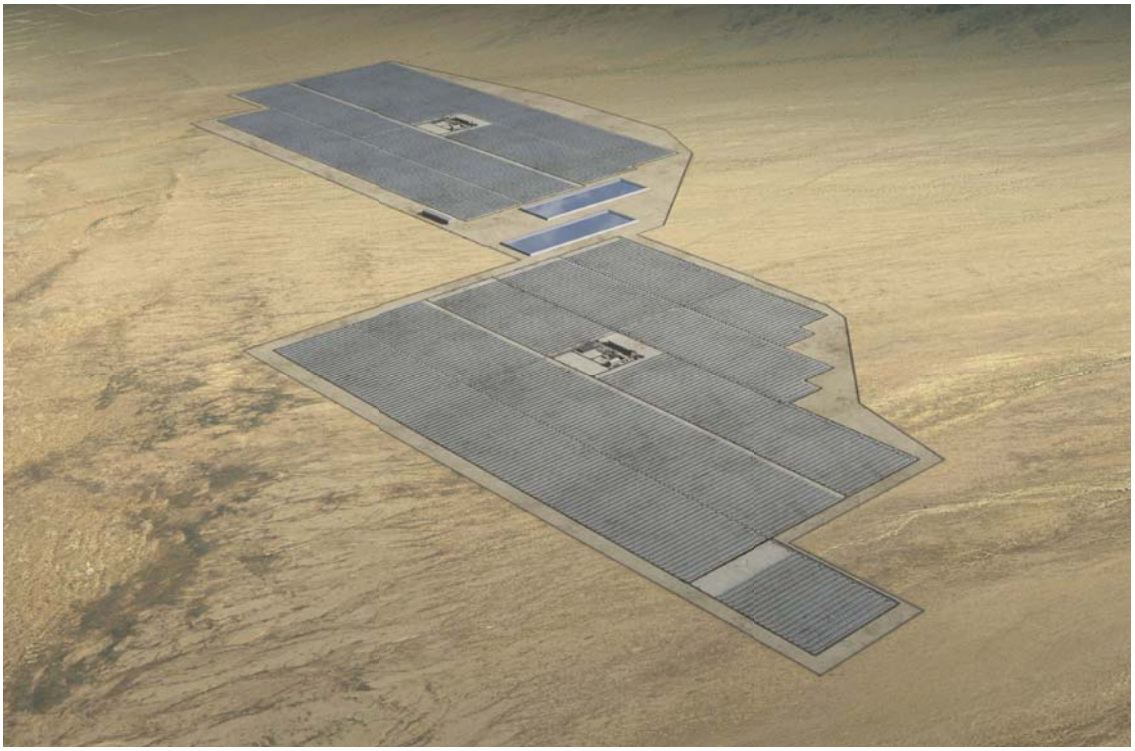
Revised Staff Assessment



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GENESIS SOLAR ENERGY PROJECT (09-AFC-8)
REVISED STAFF ASSESSMENT

EXECUTIVE SUMMARY

A. INTRODUCTION

B. DESCRIPTION OF THE PROPOSED PROJECT AND ALTERNATIVES

- **B.1 PROPOSED PROJECT**
- **B.2 ALTERNATIVES EVALUATED**
- **B.3 CUMULATIVE SCENARIO**

C. ENVIRONMENTAL ANALYSIS

- **C.1 AIR QUALITY**
- **C.2 BIOLOGICAL RESOURCES**
- **C.3 CULTURAL RESOURCES AND NATIVE AMERICAN VALUES**
- **C.4 HAZARDOUS MATERIALS MANAGEMENT**
- **C.5 HEALTH AND SAFETY**
- **C.6 LAND USE, RECREATION, AND WILDERNESS**
- **C.7 NOISE AND VIBRATION**
- **C.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE**
- **C.9 SOIL AND WATER RESOURCES**
- **C.10 TRAFFIC AND TRANSPORTATION**
- **C.11 TRANSMISSION LINE SAFETY AND NUISANCE**
- **C.12 VISUAL RESOURCES**
- **C.13 WASTE MANAGEMENT**
- **C.14 WORKER SAFETY**

D. ENGINEERING ANALYSIS

- **D.1 FACILITY DESIGN**
- **D.2 GEOLOGY, PALEONTOLOGY, AND MINERALS**
- **D.3 POWER PLANT EFFICIENCY**
- **D.4 POWER PLANT RELIABILITY**
- **D.5 TRANSMISSION SYSTEM ENGINEERING**

E. JOINT AGENCY GENERAL CONDITIONS

F. LIST OF PREPARERS

G. WITNESS QUALIFICATIONS AND DECLARATIONS

EXECUTIVE SUMMARY

Testimony of Mike Monasmith

INTRODUCTION

This Revised Staff Assessment (RSA) is being published by the California Energy Commission for the Genesis Solar Energy Project. The predecessor to this report was a Staff Assessment /Draft Environmental Impact Statement (SA/DEIS) which was a joint document published by both the California Energy Commission (Energy Commission) and the U.S. Bureau of Land Management (BLM).

On April 7, 2010 the Energy Commission and BLM determined that they would each develop and publish separate, final environmental documents. The BLM's document will be called the Final Environmental Impact Statement (FEIS).

Although the Energy Commission and BLM are no longer publishing a joint document, the Energy Commission and the BLM continue to share staff expertise, information and documentation in order to promote intergovernmental coordination at the local, state, and federal levels.

In the interests of producing a clear, comprehensive, and thorough report that addresses the same issues that were included in the published SA/DEIS, the Energy Commission, in consultation with BLM, determined that it would retain the joint document format and language. As such, this RSA does contain references to BLM and the National Environmental Policy Act (NEPA). However, this is for informational purposes only. This document is an Energy Commission document only. It is not intended to serve as a BLM or NEPA document.

The Bureau of Land Management (BLM) shares jurisdiction for this project due to the project location on federal land. While this document is not written jointly with the BLM, the proponent will be required to comply with all terms and conditions required by the BLM, as will be described in the BLM's Record of Decision and Right-of-Way grant documents for this project. The conditions of certification within this document may also require the submittal of documents and reports to other federal, state, or local agencies. It is the project owner's responsibility to ensure the timely submittal of these documents and reports.

This RSA contains staff's independent evaluation of the Genesis Solar LLC (applicant) Genesis Solar Energy Project (GSEP) Application for Certification (09-AFC-8). The RSA examines engineering, environmental, public health, and safety aspects of the GSEP, based on the information provided by the applicant and other sources available at the time the RSA was prepared. The RSA examines engineering, environmental, public health and safety aspects of the GSEP based on the information provided by the applicant and other sources available at the time the RSA was prepared. The RSA includes analyses normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA).

When considering a project for licensing, the Energy Commission is the lead state agency under CEQA, and its process is functionally equivalent to the preparation of an EIR. In support of its certification process, the Energy Commission staff has the responsibility to complete an independent assessment of the project's engineering design and its potential effects on the environment, the public's health and safety, and whether the project conforms with all applicable local, state, and federal laws, ordinances, regulations and standards (LORS). Energy Commission staff also recommend measures to mitigate potential significant adverse environmental effects, which take the form of conditions of certification for construction, operation, maintenance and eventual decommissioning of the project, if approved by the Energy Commission.

This RSA is not the decision document for these proceedings nor does it contain findings of the Energy Commission related to environmental impacts or the project's compliance with local/state/federal legal requirements. The RSA will serve as staff's testimony in evidentiary hearings to be held by a Committee of two Commissioners who are overseeing this case. The Committee will hold evidentiary hearings and will consider the recommendations presented by staff, the applicant, intervenors, additional parties, government agencies and the public prior to proposing its decision. The Energy Commission will make a final decision, including findings, after the Committee's publication of the Presiding Member's Proposed Decision.

PROPOSED PROJECT LOCATION AND DESCRIPTION

The GSEP is located approximately 25 miles west of the city of Blythe, California, on BLM-administered lands. The project area is south of the Palen/McCoy Wilderness Area and north of Ford Dry Lake and Interstate 10, and can be viewed in **Project Description Figures 1** and **2**. The applicant is seeking a Right-of-Way grant with BLM for approximately 4,640 acres of lands. (The ROW application for the GSEP was originally 19,000 acres when filed in 2007). Construction and operation of the project would disturb a total of about 1,800 acres. As such, any difference between the total acreage listed in the Right-of-Way application (4,640) and the total acreage required for project construction and operation (approx. 1,800) would not be part of the ROW grant, if BLM decides to approve the project.

The Project area is located in east central Riverside County, where land use is characterized predominantly by open space and conservation and wilderness areas. The western portion of the county accounts for most of the developed area of the county, including urban areas and agricultural areas. The southeastern corner of the county to the east of the Project also contains limited agricultural areas and rural development (Riverside County, 2003).

The area designated within the Palo Verde Valley Area Plan occurs to the east of the Project and encompasses the developed and agricultural area in eastern Riverside County. The portion of the Palo Verde Valley Area Plan in the vicinity of the Project consists mainly of sparsely populated desert and mountain areas. The more populated and agricultural areas occur farther east of the GSEP in the vicinity of Blythe.

The Project is also located within the BLM California Desert Conservation Area Plan (CDCA Plan) (BLM, 1980), and is shown in **Project Description Figure 3**. The CDCA Plan establishes a number of conservation areas under the Wilderness Review Program. The Project is located adjacent to the southern boundary of the Palen/McCoy Wilderness Area. The Chuckwalla Mountains and Little Chuckwalla Mountains Wilderness Areas are also located farther south-southwest of the Project.

The Genesis project will utilize solar parabolic trough technology to generate electricity. With this technology, arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. A heat transfer fluid (HTF) is heated to high temperature (750°F) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced.

MAJOR COMPONENTS OF THE PROPOSED PROJECT

The following items are some of the major components of GSEP. For a more exhaustive list, please see the **Project Description** section of this RSA.

Project Construction

Project construction is expected to occur over a total of 39 months. Project construction will require an average of 646 employees over the entire 39-month construction period, with labor requirements peaking at approximately 1,085 workers in month 23 of construction. The construction workforce will consist of laborers, craftsmen, supervisory personnel, support personnel, and management personnel.

Temporary construction parking areas will be provided within the power plant site adjacent to the laydown area. The plant laydown area will be utilized throughout the build out of the two solar units. If approved, project construction would begin in the fourth quarter of 2010, with commercial operation commencing in the second quarter of 2013.

Operation and Maintenance

While electrical power is to be generated only during daylight hours, GSEP will be staffed 24 hours a day, seven days per week. A total estimated workforce of 40-50 full time employees will be needed once the GSEP is fully operational.

Transmission System

The GSEP generation tie-line would interconnect with the expanded Southern California Edison (SCE) Colorado River Substation, to be located south and west of the city of Blythe, California. Additionally, fiber-optic telecom lines will run along the generation tie-line between GSEP and the Colorado River Substation for purposes of communication.

Transmission Line Route

The proposed new transmission line, along with a new access road and new natural gas pipeline, will be co-located in one linear corridor to serve the main GSEP facility. This

corridor would exit the facility to the south and would be approximately 6.5 miles long. The generation tie-line would cross Interstate 10 (I-10), and tie into the Blythe Energy Project Transmission Line (BEPTL). There will be six additional poles needed to transfer GSEP electricity from the BEPTL into the Colorado River Substation at the last point of interconnection.

Fuel Supply and Use

The auxiliary boiler will be fueled by natural gas supplied from a new six-mile, eight-inch pipeline connected to an existing Southern California Gas pipeline located north of I-10. The maximum estimated natural gas usage is expected to be 60 million standard cubic feet per year, for a maximum of 60,000 million British thermal units per year.

Water Use

The GSEP proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water (steam) makeup, and other industrial purposes uses such as mirror washing would be supplied from onsite groundwater wells, and stored in several on-site tanks. Storage tanks would contain raw water (500,000 gallons), treated water (1,250,000 gallons) and wastewater (250,000 gallons). Project cooling water blowdown would be piped to lined, onsite evaporation ponds (two, 30-acre ponds that will be covered by nets to discourage migratory and local bird usage). After used project water has gone through the evaporation process, the solids that settle at the bottom of the evaporation pond will be periodically tested by the applicant, and removed to a licensed, non-hazardous waste disposal facility.

Water Requirements

The GSEP proposes to utilize approximately 1,605 acre-feet of ground water per year (AFY) for its operation. To conserve water in the desert and comply with Energy commission policy, staff recommends that the applicant use dry cooling technology for the GSEP. Dry cooling would require 202 AFY during operations. To offset the use of groundwater, staff is recommending the applicant apply for allocations of Colorado River water (to the extent possible), implement a Water Conservation Plan, or both.

Water Source and Quality

The GSEP water needs will be met by use of groundwater pumped from one of two wells on the plant site. Water for domestic uses by project employees will also be provided by onsite groundwater treated to potable water standards. Groundwater modeling testing data indicates that the onsite groundwater has varying levels of totally dissolved solids (TSD) that range from 3,000 to 5,000 mg/l.

Solar Mirror Washing Water

Water from the primary desalination process (reverse osmosis, RO water) will be deionized and used to clean the solar collectors and to facilitate dust and contaminant removal. The collectors would be cleaned once or twice per week, determined by the reflectivity monitoring program. This mirror washing operation would be done at night, and involves a water truck spraying treated water on the mirrors in a drive-by fashion.

The applicant expects that that the mirrors will be washed weekly in winter and twice weekly from mid-spring through mid-fall. Because the mirrors are angled down for washing, water does not accumulate on the mirrors; instead, it would fall from the mirrors to the ground and, due to the small volume (two acre-feet/year), is expected to soak in with no appreciable runoff. Any remaining rinse water from the washing operation would be expected to evaporate on the mirror surface.

PROPOSED PROJECT OBJECTIVES

The specific objectives of the Genesis Solar Energy Project are:

- To develop a utility-scale solar energy project utilizing parabolic trough technology;
- To construct and operate an environmentally friendly, economically sound, and operationally reliable solar power generation facility that will contribute to the State of California's renewable energy goals;
- To locate in an area with high solar insolation (high solar energy intensity);
- To interconnect directly to the California Independent System Operator (CAISO) Grid through the Blythe Energy Project Transmission Line (BEPTL) and the Southern California Edison (SCE) electrical transmission system; and
- To fulfill Governor Schwarzenegger's and Interior Secretary Salazar's Memorandum of Understanding to expedite renewable energy development in California.

SUPPORT FOR PROPOSED PROJECT

The Federal government and the State of California have established the need for the nation and state to increase the development and use of renewable energy in order to enhance the nation's energy independence, meet environmental goals, and create new economic and employment growth opportunities.

The Genesis Solar Energy Project would help meet these national and state renewable energy needs by:

- Assisting California in meeting its Renewable Portfolio Standard goals of 20 percent of retail electric power sales by 2010 under existing law (Senate Bill 1078 – Chapter 516, Statutes of 2002);
- Supporting U.S. Secretary of the Interior Salazar's Orders 3283 and 3285 making the production, development and delivery of renewable energy top priorities for the United States;
- Supporting Governor Schwarzenegger's Executive Order S-14-08 to streamline California's renewable energy project approval process and to increase the State's Renewable Energy Standard to 33 percent renewable power by 2020;
- Supporting the greenhouse gas reduction goals of Assembly Bill 32 (California Global Warming Solutions Act of 2006); and
- Sustaining and stimulating the economy of Southern California by helping to ensure an adequate supply of renewable electrical energy, while creating additional

construction and operations employment and increased expenditures in many local businesses.

CEQA PROCESS

The Energy Commission's siting regulations require Energy Commission staff to independently review the AFC and assess whether the list of environmental impacts contained is complete and whether additional or more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, §§ 1742 and 1742.5(a)).

In addition, Energy Commission staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Energy Commission staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., title 20, § 1744(b)).

Energy Commission staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act (CEQA). No additional Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the California Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., title 14, § 15251 (j)).

Energy Commission staff's impact assessment, including the recommended conditions of certification, is only one piece of evidence that the Committee assigned to oversee the Genesis Solar Energy Project AFC will consider in reaching a decision on the proposed project and making its recommendation to the full Energy Commission. At the public evidentiary hearings (scheduled to begin on July 12, 2010), all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the assigned Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether to approve the proposed project will be contained in a document entitled the Presiding Member's Proposed Decision (PMPD). Following its publication, the PMPD is circulated in order to receive written public comments. At the conclusion of that comment period, the PMPD is submitted to the full Energy Commission for a decision (the Committee may also chose to prepare a revised PMPD prior to full Energy Commission decision). If the Committee does prepare a Revised PMPD, at the close of its comment period, the PMPD will then be submitted to the full Energy Commission for a decision.

PUBLIC NOTICES, OUTREACH, AND PUBLIC AND AGENCY INVOLVEMENT

PUBLIC COORDINATION

The Energy Commission collaborated with a number of state and federal wildlife agencies in their efforts to facilitate robust public participation in the regulatory review of the GSEP. To reach this goal, Energy Commission staff conducted sixteen (16) to discuss technical issues related to the proposed project, and determine if GSEP should be approved for construction and operation, and if so, under what set of conditions. These workshops formed the basis of discovery for the proceeding, and provided the public, parties to the proceeding (applicant and intervenors), as well as local, state, and federal agencies the opportunity to ask questions about, and provide input on, the proposed project. The Energy Commission issued notices for these workshops prior to each meeting.

INITIAL PUBLIC NOTICE AND OUTREACH

On December 10, 2009, the Energy Commission, with participation from BLM, held a publicly-noticed Informational Hearing at Blythe City Hall Council Chambers in Blythe, California. On December 11, 2009, BLM held its formal Scoping Meeting at the University of California-Riverside, Palm Desert Campus.

ENERGY COMMISSION STAFF'S PUBLIC OUTREACH

Energy Commission staff provides formal notices to property owners within 1,000 feet of the proposed site and within 500 feet of a linear facility (such as transmission lines, gas lines and water lines). Staff mailed the public notices on October 6, 2009, informing the public, agencies, and elected officials of the Commission's receipt and availability of the application 09-AFC-8. Each notice contained a link to a Commission-maintained project website (http://www.energy.ca.gov/sitingcases/genesis_solar/index.html).

LIBRARIES

On September 29, 2009, the Energy Commission staff also sent copies of the GSEP AFC to the following libraries:

Riverside Main Library 3581 Mission Inn Avenue Riverside, CA 92501	Palo Verde Valley District Library 125 West Chanslor Way Blythe, CA 92225-1245

In addition to these local libraries, copies of the AFC and SA/DEIS (sent on April 10, 2010) were also made available at the Energy Commission's Library in Sacramento, the California State Library in Sacramento, as well as, state libraries in Eureka, Fresno, Los Angeles, San Diego, and San Francisco.

ENERGY COMMISSION'S PUBLIC ADVISER'S OFFICE

The Energy Commission's outreach program is also facilitated by the Public Adviser's Office (PAO). The PAO requested public service announcements at a variety of

organizations including *The Desert Independent,* Blythe City Council, three separate Chambers of Commerce, and local (Palm Springs) television and radio stations. These notices informed the public of the Commission's receipt of the GSEP Application for Certification (AFC), and invited the public to attend the Public Site Visit (of the proposed GESP site) and Informational Hearing/BLM Scoping Meeting on December 10, 2009 in Blythe, CA.

BLM AND CEC PUBLIC WORKSHOPS

Staff from the Energy Commission held Data Request, Data Response, and Issues Resolution Workshops in the following California communities: Blythe, Palm Desert, Palm Springs, and Sacramento. These sixteen (16) workshops were conducted on the following days: November 23 and 24, 2009; December 10, 18 and 31, 2009; January 6, 11 and 12, 2010; February 10 and 18, 2010; April 19, 20 and 21, 2010; and May 5, 10 and 11, 2010. During each of these workshops, specific time for public participation was allocated, and public comment was taken. These workshops provided a public forum for the applicant, interveners, staff and cooperating agencies to interact regarding project issues.

PROJECT SPECIFIC AGENCY COORDINATION

On October 6, 2009, the Energy Commission staff sent a notice of receipt and a copy of the GSEP Application for Certification to all local, state, and federal agencies that might be affected by the proposed project. On April 13, 2010, the Energy Commission staff sent a notice of availability and a copy of the GSEP SA/DEIS to the same list of local, state, and federal agencies. Staff continues to seek cooperation and or comments from regulatory agencies that administer LORS which may be applicable to proposed project. These agencies may include, as applicable, the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Colorado River Board of California, Metropolitan Water District, California Department of Transportation, State Water Resources Control Board, Colorado River Regional Water Quality Control Board, California Department of Fish and Game (CDFG), and the California Air Resources Board/Mojave Desert Air Quality Management District, among others. Additionally, staff notified agencies on November 9, 2009, informing them of the availability of supplemental information for the 09-AFC-8 proceeding, and also sent the same list CD copies of the Genesis SA/DEIS on April 13, 2010 for their review and comment.

Staff (particularly the **Biological Resources** staff) worked collaboratively with the CDFG and the USFWS to evaluate the proposed GSEP, and provide analysis contained within both the SA/DEIS and this Revised Staff Assessment. Both CDFG and the USFWS attended and participated in the many public workshops to address the wildlife issues and related "Incidental Take Permits" required for the proposed GSEP. Additionally, staff has benefited from the cooperation of the CDFG in evaluating the proposed streambed alteration agreements that would normally fall under CDFG's jurisdiction if not for the Energy Commission's "in lieu" permitting authority.

GOVERNMENT TO GOVERNMENT CONSULTATION - NOTIFICATION OF THE LOCAL NATIVE AMERICAN COMMUNITIES

The BLM staff first sent initial letters to fourteen (14) Native American tribes regarding the GSEP on November 26th 2007. The letter sought their comments, and invited them to consult on the project on a government-to government basis. Replies were received from the following three (3) Tribes requesting reports, expressing concerns, or referring to neighboring groups whom may have an interest in the project area.

1. Agua Caliente Band of Cahuilla Indians

2. Quechan Indian Tribe

3. Morongo Band of Mission Indians

A second set of letters were mailed to tribes on November 23, 2009 requesting comments and/or specific concerns. On February 22, 2010, the BLM sent an update letter containing information about project review; CEC-BLM staff workshops; the upcoming release of the SA/DEIS; and, cultural resources surveys from summer 2009 and winter 2010. Native American Tribes continue to consult on eligibility evaluations of archeological sites and the Programmatic Agreement (PA) being prepared by BLM, the State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (ACHP). Energy Commission staff receive updates on the PA, and the **Cultural Resources** section of the RSA Supplemental will reflect collaborative efforts in this regard.

RESPONSE TO COMMENTS

The federal Notice of Intent (NOI) to prepare an Environmental Impact Statement/Staff Assessment for GSEP was published in the *Federal Register (Volume 74, No. 224)* on November 23, 2009. Several organizations representing members of the public interested in the construction and operation of the GSEP submitted NOI comment letters, detailed in **Executive Summary Table 1**. Staff responded to these comments throughout the RSA (see the **Biological Resources** section of this RSA), and will also be providing responses to comments received by July 8, 2010 (end of 90-day comment period) for the GSEP SA/DEIS that was published in the *Federal Register (Volume 75, No. 68)* on April 9, 2010.

Staff published the GSEP SA/DEIS on March 26, 2010, and distributed a public Notice of Availability for the document on April 13, 2010 that provided a 30-day comment period (which concluded on May 13, 2010). No comments were received within this 30-day public comment, except for those filed by the Applicant and intervenor California Unions for Reliable Energy (CURE). Responses to comments from the applicant and CURE are inherent within the specific sections of this Revised Staff Assessment, including **Biological Resources, Hazardous Materials, Soil and Water Resources**, and **Worker Safety and Fire Protection.**

EXECUTIVE SUMMARY Table 1 -- NOTICE OF INTENT (NOI) COMMENTS
*RESPONSES INCLUDED IN REVISED STAFF ASSESSMENT

NAME	DATE	PROCESS/FAST TRACK/LNP	ALTERNATIVES	AIR / HEALTH	*BIOLOGY / BOTANY/RES	CLIMATE CHANGE	CULTURAL / NATIVE AMERICAN	ECONOMIC/SOCIOECONOMIC	OTHER_CONSIDERATIONS/CUMULATIVE IMPACT	TRAFFIC/ACCESS	WATER/HYDROLOGY	VISUAL/VRM/AESTHETICS	*WILDLIFE/T&E/HABITAT	LIGHTING/PUBLIC UTILITIES	DESIGN	FLOODING	RECREATION/OHV	SOIL/GEOLOGY	HAZMAT	NOISE	ADD TO MAILING
California Native Plant Society	12/23/2009				X						X		X								
California Unions for Reliable Energy (CURE)	12/23/2009			X	X	X	X				X		X								
Center for Biological Diversity	12/29/2009				X	X			X		X		X					X			
A McPherson, US EPA Reg. 9	12/23/2009		X	X	X	X															
J. Aardahl Defenders of Wildlife	12/23/2010		X		X				X				X								
CARE, Arturo Figueroa	12/23/2009				X		X	X				X	X								
M. J. Connor PH.D Western Watershed Project	12/23/2009		X		X		X		X									X			
Off-Road Business Association, Inc.	12/23/2009							X		X							X				

ENVIRONMENTAL JUSTICE

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” focuses federal attention on the environment and human health conditions of minority communities and calls on federal

agencies to achieve environmental justice as part of this mission. The Order requires the United States Environmental Protection Agency (US EPA) and all other federal agencies to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority or low-income populations. Some agencies have also interpreted this Order as applying to state agencies that receive federal funding. Energy Commission staff assumes that the Order applies, and conducts the appropriate analysis accordingly.

This analysis is also necessary to satisfy BLM's obligations under Executive Order 12898. In considering environmental justice in energy facility siting cases, staff uses a demographic screening analysis to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. The demographic screening is based on information contained in two documents: "Environmental Justice: Guidance Under the National Environmental Policy Act" (Council on Environmental Quality, December, 1997) and "Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses" (U.S. Environmental Protection Agency, April, 1998).

The Environmental Justice screening process relies on Year 2000 U.S. Census data to determine the presence of minority and below-poverty level populations. Environmental Justice: Guidance Under the National Environmental Policy Act, defines minority individuals as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified when the minority population or the below-poverty-level population of the potentially affected area is:

1. greater than 50%; or

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

In addition to the demographic screening analysis, staff follows the steps recommended by the U.S. EPA's guidance documents in regard to outreach and involvement; and if warranted, a detailed examination of the distribution of impacts on segments of the population.

Staff has followed each of the above steps for the following eleven (11) sections in the SA/DEIS: **Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Socioeconomics, Soils and Water Resources, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources,** and **Waste Management**. Over the course of the analysis for each of these eleven technical disciplines, staff considered potential impacts and mitigation measures, and whether there would be a significant impact on an environmental justice population. Staff determined that the remaining technical areas did not involve potential environmental impacts that could contribute to a disproportionate impact on an environmental justice population, and so did not necessitate further environmental justice analysis for those areas.

PROJECT'S COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Based upon the information provided, discovery achieved and analysis completed to date, staff has concluded that with just two exceptions, the implementation of its recommended mitigation measures – described in the conditions of certification – will mitigate all potential environmental impacts of the GSEP to a level of less than significant. Therefore, the project analysis complies with the requirements of the California Environmental Quality Act (CEQA). For a detailed review of potentially significant impacts and the related mitigation measures (conditions of certification), please refer to each chapter of this Revised Staff Assessment.

Within the technical area of **Transmission System Engineering (TSE),** additional information is necessary and required in regard to specific issues that are described in the sections' summary of conclusions. However, most of these outstanding issues will be addressed in a forthcoming **TSE Appendix A**.

As noted in the **Land Use** and **Visual Resources** sections of this RSA, cumulative impacts would be considerable and cannot be mitigated to less than significant levels. Therefore, if this project were to be approved, an override consideration will be necessary and appropriate.

Staff also concludes that with implementation of staff's recommended mitigation measures described in each technical section's conditions of certification, GSEP would comply with all applicable laws, ordinances, regulations, and standards (LORS), except as described in the **Soil and Water Resources** section.

Specifically, the state of California has expressed a strong interest in developing its solar energy resources. However, the construction and operation of solar energy facilities requires the use of water, which state policy also protects. The Energy Commission must balance the state's interest in promoting solar energy development with its interest in conserving and protecting the state's water resources. GSEP proposes to use water for power plant cooling, which staff believes is contrary to the state's long term interest in maximizing solar power generation and minimizing adverse environmental impacts. To conserve water in the desert and comply with Energy commission policy, staff recommends that the applicant use dry cooling technology for the GSEP. This will be an especially critical issue in the renewable development areas that will be identified in the joint state/federal Renewable Energy Action Team's Desert Renewable Energy Conservation Plan (DRECP). Later this year, Energy Commission staff plans to file a request for an Energy Commission Order Instituting an Informational Proceeding to address the overall issue of water use (particular groundwater use) by solar thermal power plants. For a more detailed discussion of water policy and related LORS, see staff's technical analysis in the **Soil and Water Resources** section of this RSA.

SUMMARY OF ENVIRONMENTAL IMPACTS AND RELATED MITIGATION (FOR ENERGY COMMISSION AND CEQA PURPOSES)

Executive Summary Table 2 -- Summary of GSEP SA/DEIS Technical Analyses

Technical Area	Complies with LORS	Impacts Mitigated
Air Quality	Yes	Yes
Alternatives	Not Applicable	Not Applicable
Biological Resources	Yes	Yes
Cultural Resources	Undetermined	Undetermined
Efficiency	Not Applicable	Not Applicable
Facility Design	Yes	Yes
Geology and Paleontology	Yes	Yes
Hazardous Materials	Yes	Yes
Land Use	Yes	**No***
Noise and Vibration	Yes	Yes
Public Health	Yes	Yes
Reliability	Not Applicable	Not Applicable
Socioeconomic Resources	Undetermined	Undetermined*
Soil and Water Resources	**No**	Yes
Traffic and Transportation	Yes	Yes
Transmission Line Safety/Nuisance	Yes	Yes
Transmission System Engineering	Yes	Yes
Visual Resources	Yes	**No***
Waste Management	Yes	Yes
Worker Safety and Fire Protection	Yes	Yes

*cumulative impacts

Staff will release a Genesis Revised Staff Assessment Supplemental by early July, 2010 that will contain a more-refined **Socioeconomics** section and a completed **Cultural Resources** section. This supplemental filing will also contain outstanding information for the **Air Quality** section (FDOC from Mojave Desert Air Quality Management District), **TSE Appendix A,** and any other necessary information.

RECOMMENDATIONS

The RSA is a document of the Energy Commission staff that has been developed and written with staffs from several other governmental agencies, including the Bureau of Land Management. However, the conclusions and recommendations presented should be viewed as Energy Commission staff's analysis of the project, and its testimony.
In summary, this RSA finds that, with the few exceptions noted above, the Genesis Solar Energy Project is in conformance with all LORS. Where Project impacts were identified, Energy Commission staff recommends mitigation to offset direct, indirect, and cumulative impacts to a level of less than significant, and to assure compliance with state and federal laws such as the federal and state endangered species acts.

A - INTRODUCTION

Mike Monasmith

This Revised Staff Assessment (RSA) is being published by the staff of the California Energy Commission (Energy Commission). The predecessor to this report was a March 26, 2010 Staff Assessment /Draft Environmental Impact Statement (SA/DEIS), which was a joint document published by both the Energy Commission and the U.S. Bureau of Land Management (BLM).

On April 7, 2010 both the Energy Commission and BLM determined that they would develop and publish a separate final document. The BLM's document will be called a Final Environmental Impact Statement (FEIS). Although the Energy Commission and BLM are no longer publishing a joint document, the Energy Commission and the BLM continue to share staff expertise, information and documentation in order to promote intergovernmental coordination at the local, state, and federal levels.

In the interests of producing a clear, comprehensive, and thorough report that addresses the same issues that were included in the Genesis SA/DEIS, the Energy Commission, in consultation with BLM, determined that the RSA would retain the joint document format and language used in the SA/DEIS. As such, specific language that mentions either the BLM or the National Environmental Policy Act (NEPA) is referenced for informational purposes only.

This RSA contains staff's independent evaluation of the Genesis Solar LLC (applicant) Genesis Solar Energy Project (GSEP) application, which was filed with the Energy Commission on August 31, 2009 (09-AFC-8). The RSA examines engineering, environmental, public health, and safety aspects of the GSEP, based on the information provided by the applicant and other sources available at the time the RSA was prepared, and includes analyses normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA).

In support of its CEQA certification process, the Energy Commission staff has the responsibility to complete an independent assessment of the project's engineering design and its potential effects on the environment, the public's health and safety, and whether the project conforms with all applicable laws, ordinances, regulations and standards (LORS). The staff also recommends measures to mitigate potential significant adverse environmental effects and conditions of certification for construction, operation, maintenance and eventual decommissioning of the project, if approved by the Energy Commission. This RSA is not the decision document for these proceedings nor does it contain findings of the Energy Commission related to environmental impacts or the project's compliance with local/state/federal legal requirements.

The RSA will serve as staff's testimony in evidentiary hearings to be held by the Committee of two Commissioners who are overseeing this case. The Committee will hold evidentiary hearings on July 12 and 13, 2010, and will consider the recommendations presented by staff, the applicant, all parties, government agencies, and the public prior to proposing its decision. The Energy Commission will make a final decision, including findings, after the Committee's publication of its proposed decision.

A.1 AGENCY AUTHORITIES AND RESPONSIBILITIES

Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, the Energy Commission routinely seeks comments from, and works closely with, other regulatory agencies administering LORS that may be applicable to the proposed project. The following paragraphs describe the agency coordination that has occurred throughout this proceeding.

A.1.1 U.S. BUREAU OF LAND MANAGEMENT (BLM)

The Bureau of Land management's authority for the proposed action is the Federal Land Policy and Management Act (FLPMA) of 1976 [43 United States Code (U.S.C.) 1701 et seq.], The proposed action is consistent with Section 211 of the Energy Policy Act (EP Act) of 2005 (119 Stat. 594, 600), and BLM's Solar Energy Development Policy of April 4, 2007. The FLPMA authorizes BLM to issue right-of-way grants for renewable energy projects. Section 211 of the Energy Policy Act of 2005 states that the Secretary of the Interior should seek to have approved a minimum of 10,000 megawatts of renewable energy generating capacity on public lands by 2015.

A.1.2 CALIFORNIA ENERGY COMMISSION (CEC)

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants that are 50 megawatts (MW) or larger in the state. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and by federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review power plant AFCs to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts (Pub. Resources Code, § 25519), and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25523 (d)). The Energy Commission staff's analyses were prepared in accordance with Public Resources Code, sections 25500 et seq.; Title 20, California Code of Regulations, sections 1701 et seq.; and CEQA (Pub. Resources Code, §§ 21000 et seq.).

A.1.3 US FISH AND WILDLIFE SERVICE (USFWS) AND THE CALIFORNIA DEPARTMENT OF FISH AND GAME (CDFG)

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction to protect threatened and endangered species under the Endangered Species Act (ESA). Formal consultation with the USFWS under Section 7 of the ESA is required for any federal action that is likely to adversely affect a federally-listed species. This consultation is initiated through the preparation and submittal of a Biological Assessment (BA) which describes the proposed project to the USFWS. Following review of the BA, the USFWS may issue a Biological Opinion (BO), which will specify mitigation measures that must be implemented for any protected species.

California Department of Fish and Game

The California Department of Fish and Game (CDFG) has the authority to protect water resources of the state through regulation of modifications to streambeds, under Section 1602 of the Fish and Game Code. The Energy Commission, BLM, and the applicant have provided information to CDFG to assist in their determination of the impacts to streambeds, and identification of permit and mitigation requirements. The applicant filed a Streambed Alteration Agreement with CDFG. The requirements of the Streambed Alteration Agreement will be included as a recommended Condition of Certification for mitigation discussed in detail in this RSA.

CDFG also has the authority to regulate potential impacts to species that are protected under the California Endangered Species Act (CESA). Accordingly, the applicant for the Genesis Solar Energy Project has filed appropriate incidental take permit applications, which are part of the Genesis record, and are included with this document. The requirements of the Incidental Take Permits and Streambed Alteration Agreement are included as a recommended Condition of Certification for mitigation measures discussed in the **Biological Resources** section of this RSA.

A.1.4 OTHER AGENCIES WITH AUTHORITY

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) has jurisdiction to protect water quality and wetland resources under Section 404 of the Clean Water Act. Under that authority, USACE reviews proposed projects to determine whether they may impact such resources, or are subject to a Section 404 permit. Throughout the Genesis proceeding, the Energy Commission and BLM have provided information to the USACE to assist their determination regarding jurisdiction and need for a Section 404 permit.

Mojave Desert Air Pollution Management District

The project site is located in the Mojave Desert Air Basin[1] and is under the jurisdiction of the Mojave Desert Air Quality Management District (District). Based upon the authorities in 40 Code of Federal Regulations (CFR) Part 52 and 40 CFR Part 60, the District is responsible for issuing the federal New Source Review (NSR) permit and has been delegated enforcement of the applicable New Source Performance Standard (Subpart IIII) under rules promulgated in the federal Clean Air Act.

California Department of Transportation

The department of transportation has jurisdiction over encroachments to Caltrans facilities and related easements and rights-of way, including Intersate-10 (I-10) the primary East-West transportation artery through Riverside County.

[1] The Mojave Desert Air Basin lies inland southeast of the San Joaquin Valley Air Basin, and northeast of the South Coast Air Basin. The desert portions of Kern, San Bernardino, Riverside, and Los Angeles counties are within its boundaries.

Riverside County

The County of Riverside would normally have authority to issue building permits to the GSEP. However, because the GSEP is proposed to be constructed on federal land and the project is also subject tothe in-lieu permitting authority of the Energy Commission, building permits will not be issued by the county.

Other Agencies

For a comprehensive review of all agencies and their corresponding permits, licenses, and LORS conformance for specific areas, see staff's technical analyses in the individual sections of this Revised Staff Section.

A.2 CASE AND PROPERTY DESCRIPTION

The Genesis Solar Energy Project (GSEP) is located approximately 25 miles west of the city of Blythe, California, on BLM-administered land. The project area is south of the Palen/McCoy Wilderness Area and north of Ford Dry Lake and Interstate 10.

The proposed GSEP is entirely on BLM-administered land located in Township 6S Range 18E and Township 6S Range 19E, San Bernardino Base and Meridian.
The applicant is seeking a right-of-way grant for approximately 4,640 acres of land administered by the BLM. Construction and operation of the project would disturb a total of about 1,800 acres. As such, any difference between the total acreage listed in the Right-of-Way application (4,640) and the total acreage required for project construction and operation (approx. 1,800) would be excluded from the ROW grant, if BLM decides to approve the project.

The Project area is located in eastern Riverside County, where land use is characterized predominantly by open space and conservation and wilderness areas. The western portion of the county accounts for most of the developed area of the county, including urban areas and agricultural areas. The southeastern corner of the county to the east of the Project also contains limited agricultural areas and rural development (Riverside County, 2003).

A.3 BLM LAND USE PLAN CONFORMANCE

The principal land use plan affecting this proposed project is the U.S. Bureau of Land Management’s California Desert Conservation Area (CDCA) Plan of 1980, as amended.

The BLM has determined that a Land Use Plan Amendment is required because the proposed site for the GSEP is not identified in the California Desert Conservation Area (CDCA) Plan as associated with power generation or transmission lines greater than 161kV. The requested ROW grant cannot be approved unless it would be consistent with the terms of the CDCA Plan or subsequent amendments. Therefore, the BLM must consider amending the CDCA Plan to allow power generation and transmission at the proposed GSEP site as a prerequisite to granting the ROW.

Planning Criteria (BLM)

The CDCA Plan planning criteria are the constraints and ground rules that guide and direct the development of the Plan Amendment. They ensure that the Plan Amendment is tailored to the identified issues and ensure that unnecessary data collection and analyses are avoided. They focus on the decisions to be made in the Plan Amendment, and will achieve the following:

"Sites associated with power generation of transmission not identified in the Plan will be considered through the Plan Amendment process."

Because the proposed facility is not currently identified within the CDCA Plan, an amendment to identify the proposed facility within the Plan is hereby proposed. As specified in Chapter 7, Plan Amendment Process, there are three categories of Plan Amendments, including:

- Category 1, for proposed changes that will not result in significant environmental impact or analysis through an EIS
- Category 2, for proposed changes that would require a significant change in the location or extent of a multiple-use class designation; and
- Category 3, to accommodate a request for a specific use or activity that will require analysis beyond the Plan Amendment Decision.

Based on these criteria, approval of the proposed project would require a Category 3 amendment. This section summarizes the procedures necessary to evaluate the proposed Plan Amendment, as well as the procedures required to perform the environmental review of the ROW application.

BLM's Final Environmental Impact Statement (FEIS) will detail all phases of the Plan Amendment and environmental review associated with the ROW application, and will include a Proposed Land Use Plan Amendment (Proposed PA). Publication of the FEIS in the Federal Register will initiate a 30-day protest period on the Proposed PA to the Director of the BLM. Following resolution of any protests BLM may then publish an Approved Plan Amendment and a Record of Decision (ROD) on the Project Application.

A.4 CEQA PROJECT OBJECTIVES

CEQA guidelines require a clearly written statement of objectives to guide the lead agency in developing a reasonable range of alternatives and aid decision-makers in preparing findings or a statement of overriding considerations. CEQA specifies that the statement of objectives should include the underlying purpose of the project (Section 15126.6(a)).These objectives reflect the applicant's objectives and the BLM's stated purpose and need of the project and will be considered in the comparison of alternatives, as required under both NEPA and CEQA. The Energy Commission developed the following objectives for the project:

- To construct and operate an environmentally and economically sound, and operationally reliable solar power generation facility that will contribute to the State of California's renewable energy goals;

- To locate the project in an area with high solar insolation (i.e., high intensity of solar energy);
- To fulfill Governor Schwarzenegger's and Secretary Salazar's Memorandum of Understanding to expedite renewable energy development in California.

The specific objectives and purpose of GSEP as identified by the applicant are:

- To develop a utility-scale solar energy project utilizing parabolic trough technology;
- To construct and operate an environmentally friendly, economically sound, and operationally reliable solar power generation facility that will contribute to the State of California's renewable energy goals;
- To locate the project in an area with high solar insolation (i.e., high intensity of solar energy);
- To interconnect directly to the CAISO Grid through the SCE electrical transmission system; and
- To commence construction in 2010 to qualify for the American Recovery and Reinvestment Act (ARRA) of 2009's Renewable Energy Grant Program.

The applicant has proposed this project in light of the recently enacted State of California legislation and goals, which includes Senate Bill 1078, passed in 2002, establishing the California Renewable Portfolio Standard (RPS). It requires utilities to increase their sale of electricity produced by renewable energy sources, including solar facilities, by a minimum of one percent per year with a goal of 20 percent of their total sales by 2017.

However, the California Public Utilities Commission, Energy Commission and the California Power Authority adopted the Energy Action Plan (EAP), which pledged that the agencies would meet an accelerated goal of 20% by the year 2010. The California Senate then passed Senate Bill 107 to be consistent with the EAP and accelerated the implementation of RPS, requiring utilities to meet the goal of 20 percent renewable energy generation by 2010. In November 2008, California's Governor instituted Executive Order S-14-08, which establishes an updated RPS goal that all retail sellers of electricity shall serve 33% of their load with renewable energy by 2020.

GSEP would be built in an area with high potential for solar resource development. The project would allow California utilities to increase the percentage of renewable resources in their energy portfolio and aid the utilities in reaching the goals set forth by the RPS.

A.5 BLM PURPOSE AND NEED

The BLM's purpose and need for the GSEP is to respond to the applicant's application under Title V of the FLPMA (43 USC 1761) for a Right-Of-Way (ROW) Grant to construct, operate and decommission a concentrated solar thermal electric generating facility, and associated infrastructure, in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws. The BLM will decide whether to approve,

approve with modification, or deny issuance of a ROW grant to the applicant for the proposed GSEP based upon final regulatory analyses contained in its FEIS.

A.6 PROJECT EVALUATION AND APPROVAL PROCESS

This RSA contains staff's independent evaluation of the Genesis Solar Energy Project AFC (09-AFC-8), which was filed with the Energy Commission on August 31, 2009. The RSA examines engineering, environmental, public health and safety aspects of Genesis Solar Energy Project (GSEP), based on the information provided by the applicant and other sources available at the time it was prepared. This RSA is not the decision document for these proceedings nor does it contain final findings of the Energy Commission related to environmental impacts, or the project's compliance with local/state/federal legal requirements.

A.6.1 CEC EVALUATION AND APPROVAL PROCESS

The Energy Commission's siting regulations require staff to independently review the AFC and assess whether the list of environmental impacts contained is complete and whether additional or more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, §§ 1742 and 1742.5(a)).

In addition, staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., title 20, § 1744(b)).

Staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act (CEQA). No additional Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the Secretary of the California Resources Agency as equivalent to meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., title 14, § 15251 (j)).

Staff's impact assessment, including the recommended conditions of certification, is only one piece of evidence that the Committee assigned to oversee the Genesis Solar Energy Project AFC will consider in reaching a decision on the proposed project and making its recommendation to the full Energy Commission for its ultimate consideration and action. At the public evidentiary hearings scheduled to begin on July 12, 2010, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the assigned Committee also allows parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether to approve the proposed project will be contained in a document entitled the Presiding Members' Proposed Decision (PMPD). Following its

publication, the PMPD is circulated in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD (if necessary), the PMPD is submitted to the full Energy Commission for a decision.

A.6.2. AGENCY COORDINATION

The Energy Commission seeks comments from, and works closely with, other regulatory and wildlife agencies that administer LORS applicable to the proposed project. These agencies may include as applicable, the U.S. Bureau of Land management, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Colorado River Board of California, California Department of Transportation, State Water Resources Control Board/Colorado River Regional Water Quality Control Board, California Department of Fish and Game, the California Air Resources Board, the Mojave Desert Air Quality Management District and Riverside County. Collaboration between agency staff is particularly evident in the **Biological Resources** section of this RSA, although all sections and technical disciplines sought and received agency cooperation in the analysis of this project.

On October 6, 2009, the Energy Commission staff sent the GSEP AFC to all local, state, and federal agencies that might be affected by the proposed project. On November 9, 2009, staff mailed agencies a subsequent letter informing them of receipt and availability of supplemental information for the 09-AFC-8 application. And on April 14, 2010, staff mailed agencies a CD copy of the Genesis Solar SA/DEIS for their review and comment.

A.7 PUBLIC COORDINATION

SUMMARY OF THE SCOPING AND DRAFT COMMENT PROCESS

PUBLIC COORDINATION

The Energy Commission staff collaborated in its efforts to facilitate robust public participation in its regulatory review of the GSEP. As a means towards this goal, a number of public workshops and hearings have occurred on the proposal to determine whether the proposed project should be approved for construction and operation, and if so, under what set of conditions. These workshops and hearings provided the public, as well as local, state and federal agencies, the opportunity to ask questions about and provide input on the proposed project. The Energy Commission issued notices for these workshops and hearings at least 10 days prior to the meeting.

This Revised Staff Assessment (RSA) is being published by the Energy Commission; however, as noted above, the predecessor to this report was a SA/DEIS which was a joint document published by both the Energy Commission and BLM.

On April 7, 2010 both the Energy Commission and BLM determined that they would develop and publish separate, final environmental review documents. Although the Energy Commission and BLM are no longer publishing a joint document, the Energy

Commission and the BLM continue to share staff expertise, information and documentation in order to promote intergovernmental coordination at the local, state, and federal levels.

Part of this coordination includes responding to public comments. On April 9, 2010, a Notice of Availability (NOA) for the Genesis SA/DEIS was published in the *Federal Register (Volume 75, No. 68)*. The NOA triggered the commencement of a 90-day review period for the SA/DEIS, which will conclude on July 8, 2010. All comments received by this date will be addressed by the BLM in their forthcoming FEIS. The Energy Commission staff plans to coordinate its responses to these comments with the BLM, and address all relevant comments accordingly.

BLM SCOPING MEETING

The BLM's federal regulatory review for this project was initiated with publication of a Notice of Intent (NOI) in the *Federal Register (Volume 74, No. 224)* on November 23, 2009. On December 10, 2009 the CEC with participation from BLM held a publicly-noticed Informational Hearing at Blythe City Hall in Blythe, California. On December 11, 2009, BLM held its primary Scoping Meeting at the University of California-Riverside, Palm Desert Graduate Center.

LIBRARIES

On October 6, 2009, the Energy Commission staff sent the GSEP AFC to both the Riverside Main Library in Riverside, California, and the Palo Verde Valley District Library in Blythe, California. Energy Commission staff also sent paper copies of the SA/DEIS to the same list of libraries. In addition, to the local libraries, copies of the AFC and the SA/DEIS are also available at the Energy Commission's Library in Sacramento, the California State Library in Sacramento, as well as public libraries in Eureka, Fresno, Los Angeles, San Diego, and San Francisco.

PUBLIC OUTREACH EFFORTS

Energy Commission staff provides formal notices to property owners within 1,000 feet of the proposed site and within 500 feet of a linear facility (such as transmission lines, gas lines and water lines). Staff mailed the public notices on October 6, 2009, informing the public, agencies, and elected officials of the Commission's receipt and availability of the application, 09-AFC-8. Each notice contained a link to a Commission-maintained project website (http://www.energy.ca.gov/sitingcases/GENESIS_SOLAR/index.html).

DATA REQUEST, DATA RESPONSE & ISSUES RESOLUTION WORKSHOPS

Staff from the Energy Commission held Data Requests, Data Response and Issues Resolution Workshops in the following California communities: Blythe, Palm Desert, Palm Springs, and Sacramento. These workshops were conducted on the following days: November 23 and 24, 2009; December 10, 18 and 31, 2009; January 6, 11 and 12, 2010; February 10 and 18, 2010; April 12, 20 and 21, 2010; and, May 5, 10 and 11, 2010. During each of these sixteen (16) workshops, specific time for public comment was allocated, and participation was encouraged. These workshops provided a public forum for the applicant, intervenors, staff and cooperating agencies to interact regarding project issues.

NOTIFICATION TO THE LOCAL NATIVE AMERICAN COMMUNITY

The BLM staff first sent letters to various Native American tribes regarding this project on November 26th 2007. The letter sought their comments, and invited them to consult on the project on a government-to government basis. The affected Indian Tribes are currently working with the BLM in a process of ongoing collaboration highlighted by the Programmatic Agreement in regard to the identification and preservation of finds of cultural and historical significance (please see the **Cultural Resources** section of this RSA for additional information in this regard).

ENERGY COMMISSION'S PUBLIC ADVISER'S OFFICE

The Energy Commission's outreach program is also facilitated by the Public Adviser's Office (PAO). The PAO also requested public service announcements at a variety of organizations including the Blythe City Council, local newspapers, three separate Chambers of Commerce, local (Palm Springs) television and (Palm Springs and Blythe) radio stations. These notices informed the public of the Commission's receipt of the GSEP application 09-AFC-8, and invited the public to attend the Public Site Visit (to the proposed GSEP site) and Informational Hearing/BLM Scoping Meeting on December 10, 2009 in Blythe, CA.

A.8 SUPPLEMENTAL FILINGS

Staff has identified outstanding issue in three technical sections of the RSA that will need to be addressed in a filing following the June 11, 2010 publication of the RSA. Specifically, several **Transmission System Engineering** (TSE) aspects related to the Colorado River Substation will be discussed and analyzed in TSE Appendix A, due to be published on July 18, 2010. The **Air Quality** section will need to be augmented to account for the forthcoming FDOC from the Mojave Desert Air Quality Management District, and the **Socioeconomics** section of the RSA is being augmented to better account for cumulative impacts related to currently proposed and future solar project on the I-10 corridor.

B. DESCRIPTION OF THE PROPOSED PROJECT AND ALTERNATIVES

B.1 - DESCRIPTION OF PROPOSED PROJECT and ALTERNATIVES

Mike Monasmith and Susan V. Lee

B.1 PROPOSED PROJECT

B.1.1 INTRODUCTION

On August 31, 2009, the California Energy Commission received an Application For Certification (AFC) from the applicant Genesis Solar, LLC to construct and operate the Genesis Solar Energy Project (GSEP) in eastern Riverside County, approximately 25 miles west of the Arizona-California border city of Blythe, California. Following the filing of additional data and supplemental information, the AFC was deemed complete by the Energy Commission on November 4, 2009, beginning staff's analysis of the proposed project.

This section provides a description of the proposed project and three project alternatives. Two of the three project alternatives described herein are the same size. The remaining alternative is a significantly smaller version of the proposed project (approximately 50 percent smaller). This smaller alternative is being considered because of its potential ability to avoid environmental impacts to groundwater resources (the "dry cooling" alternative).

All three of the project alternatives would use the same solar electric technology and therefore have a common description of equipment, systems, processes, resource inputs, operations, closure plans and general location. As such, in order to avoid redundancy, this section will present a single project description that identifies the elements that are common to each alternative and then separately identify the elements that are unique to each alternative.

B.1.2 DESCRIPTION

The GSEP is located approximately 25 miles west of the city of Blythe, California, on BLM-administered lands. The project area is south of the Palen/McCoy Wilderness Area and north of Ford Dry Lake and Interstate 10, and can be viewed in **Project Description Figures 1** and **2**. The applicant is seeking a Right-of-Way grant with BLM for approximately 4,640 acres of lands. (The ROW application for the GSEP was originally 19,000 acres when filed in 2007). Construction and operation of the project would disturb a total of about 1,800 acres. As such, any difference between the total acreage listed in the Right-of-Way application (4,640) and the total acreage required for project construction and operation (approx. 1,800) would not be part of the ROW grant, if BLM decides to approve the project.

The Project area is located in east central Riverside County, where land use is characterized predominantly by open space and conservation and wilderness areas. The western portion of the county accounts for most of the developed area of the county, including urban areas and agricultural areas. The southeastern corner of the

county to the east of the Project also contains limited agricultural areas and rural development (Riverside County, 2003).

The area designated within the Palo Verde Valley Area Plan occurs to the east of the Project and encompasses the developed and agricultural area in eastern Riverside County. The portion of the Palo Verde Valley Area Plan in the vicinity of the Project consists mainly of sparsely populated desert and mountain areas. The more populated and agricultural areas occur farther east of the GSEP in the vicinity of Blythe.

The Project is also located within the BLM California Desert Conservation Area Plan (CDCA Plan) (BLM, 1980), and is shown in **Project Description Figure 3**. The CDCA Plan establishes a number of conservation areas under the Wilderness Review Program. The Project is located adjacent to the southern boundary of the Palen/McCoy Wilderness Area. The Chuckwalla Mountains and Little Chuckwalla Mountains Wilderness Areas are also located farther south-southwest of the Project.

The Genesis project will utilize solar parabolic trough technology to generate electricity. With this technology, arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. A heat transfer fluid (HTF) is heated to high temperature (750°F) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced.

The overall site layout and generalized land uses are characterized as follows:

- 250-MW facility, including solar generation facilities, on-site substation, administration, operations and maintenance facilities: approximately 1,800 acres;
- Two evaporation ponds: up to 30 acres (located within the 1,800-acre site);
- The generated electrical power from the Project switchyard will be transmitted through a generation-tie (gen-tie) line that will be routed in a southeasterly ROW eventually connecting to the Southern California Edison (SCE) 500-230 kV Colorado River substation via the Blythe Energy Project Transmission Line (BEPTL);
- Additional linear facilities include a 6.5 mile access road and natural gas pipeline;
- Surface water control facilities for storm water flow and discharge; and
- Temporary construction laydown area(s) will be accommodated within the larger site footprint. No additional laydown areas outside the eventual project footprint are contemplated.

The following sections describe the site arrangement and the processes, systems, and equipment that constitute the generation facilities. All plant facilities will be designed, constructed and operated in accordance with applicable laws, ordinances, regulations and standards (LORS). All generating facilities would be located within the fence line of each of the alternative projects. **Project Description Figure 1** illustrates the regional setting for the proposed project. Project related, linear facilities (approximately 6.5 miles in length) located outside the project fence line are limited to a new 230-kV transmission line, access road, and the 8-inch natural gas pipeline.

Major Facilities and Site Arrangement

Overall project facilities include the following major components:

- Solar field(s);
- Power block;
- Access road from I-10 (Wiley Wells exit) to onsite office;
- Office and parking;
- LTU (Land Treatment Unit) for bioremediation of HTF-contaminated soil;
- Maintenance buildings and laydown area; and,
- Onsite transmission facilities including switchyard.

Each 125 MW power plant (one for the eastern solar field, and one for the western solar field) consists of:

- STG (Steam Turbine Generator);
- SSG (Servicing Scenario Generator) heat exchangers;
- Surface condenser;
- Feedwater pumps;
- Feedwater heaters;
- Wet cooling tower;
- Evaporation ponds;
- Natural gas-fired boilers; and,
- Solar thermal collection field

The plant's power cycle is the Rankine-with-reheat thermodynamic cycle. A preliminary heat balance diagram for the process is included in Figure 3.4-6. The thermal input is via heated HTF from the parabolic trough solar field at a temperature of approximately 740F.

Overall annual availability for each 125 MW facility is expected to be between 96 to 98 percent of possible operating hours (between 3,000 and 3,200 hours per year). Each plant's capacity factor will depend on the local solar insolation, but has been estimated to be approximately 27 percent, or approximately 300,000 MWh/year. Each 125 MW plant will use the Rankine thermodynamic cycle with reheat described as follows:

Process 1: The working fluid (water) is pumped from low to high pressure. During this process, steam extracted from the STG is used to preheat the water prior to entering the SSG system, which increases overall cycle efficiency.

Process 2: The high pressure liquid enters the SSG system where it is heated theoretically at constant pressure by the HTF to become superheated steam.

Process 3: The superheated steam expands through the high pressure section of the steam turbine, turning the generator to produce electricity. This steam is then reheated in different vessels that are part of the SSG system and sent to the reheat section of the steam turbine. The reheat exhausts into the low pressure (LP) section of the steam turbine.

Process 4: The wet steam from the LP section then enters the surface condenser where it is cooled at a constant low pressure to become a saturated liquid. The condensed liquid returns to Process 1.

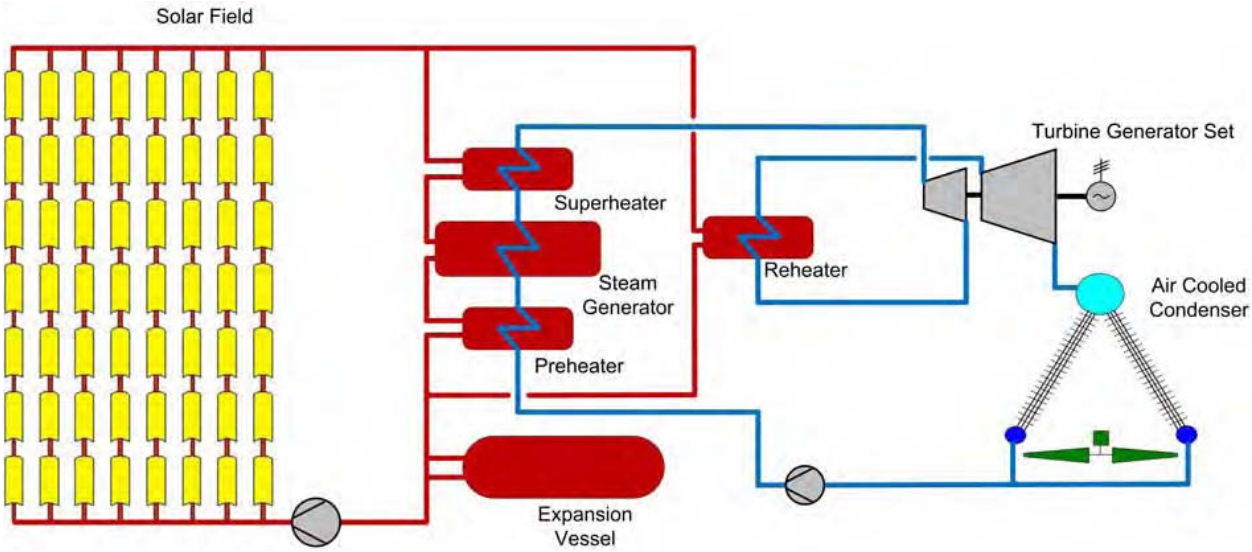
As the HTF is circulated from the SSG to the solar field, it absorbs solar energy and provides a high temperature (740°F) energy source for the Rankine cycle. Waste heat is rejected in Process 4. As the turbine exhaust is condensed, the heat is transferred to the cool circulating water. The warm circulating water carries the heat to the wet cooling tower to be rejected.

Power Generation Process

The power generating facility is composed of the following major components:

- Deaerator;
- Feedwater pumps;
- Feedwater heaters;
- SSG;
- Steam superheater;
- Steam reheater;
- STG;
- ACC; and
- Between 850 acres and approximately 1,700 acres of parabolic trough solar collection fields, and HTF piping, pumping, and conditioning system – depending on which alternative is approved.

The thermodynamic cycle is illustrated in the diagram below and described in the steps that follow:



Red lines on the diagram represent HTF piping. Hot HTF flows from top to bottom in the figure, arriving from the solar fields (having captured the sun's energy) and transferring this heat from the sun to the superheater and reheater; from where it then moves the heat energy to the steam generator; and, lastly the HTF flows to the preheater before returning to the solar fields to be heated once again in a continual cycle of renewable, clean energy. The blue lines represent steam and water piping. Feedwater, the portion of the blue line between the ACC and the preheater, is heated in a series of feedwater heaters by steam turbine extractions at various pressure levels.

Solar Energy Conversion Facilities Description

This section describes the major energy conversion components of the GSEP, including the solar collection system, SSG, STG, auxiliary boilers, and HTF freeze protection heat exchanger. The Project will consist of two, single-unit parabolic trough solar fields (125 MW each) that feed a single power plant having a combined, nominal output of 250 MW. The plant will consist of a conventional steam Rankine-cycle power block, two parabolic trough solar fields, an HTF and steam generation system, as well as a variety of ancillary facilities, such as conventional water treatment, electrical switchgear, administration, warehouse, and maintenance facilities.

Individual Components of the Proposed Project

Solar Collector Assemblies - The project's SCAs are oriented north-south to rotate east-west to track the sun as it moves across the sky throughout the day. The SCAs collect heat by means of linear troughs of parabolic reflectors, which focus sunlight onto a straight line of heat collection elements (HCEs) welded along the focus of the parabolic "trough".

Heat Transfer Fluid - Therminol™ (VP-1), an aromatic hydrocarbon, biphenyl-diphenyl oxide manufactured by Solutia, is currently being considered as the HTF for the Project. Therminol is a special high-temperature oil that has an excellent operating history and is used in many heat transfer processes. Dowtherm A, an essentially chemically identical product manufactured by Dow, is being considered as an alternative to Therminol™ (VP-1).

Parabolic Trough Collector Loop - Each of the collector loops consist of two adjacent rows of SCAs, each row is about 1,300 feet long. The two rows are connected by a crossover pipe. HTF is heated in the loop and enters the header, which returns hot HTF from all loops to the power block where the power generating equipment is located.

Mirrors - Low-iron glass mirrors are mounted on the SCA. These mirrors are reliable components that have shown no long-term degradation in reflective quality. Twenty-year-old mirrors can be cleaned and brought back to like-new reflectivity. Long-term endurance of the mirror, as measured by the experience at Solar Electric Generating Station (SEGS), indicates mirror life of 30 years or more can be expected for the Project. Flexible mirror reflectivity monitoring procedures using demineralized water for mirror washing is critical. The periodic monitoring of mirror reflectivity provides a valuable quality control tool for mirror washing and helps to optimize wash labor.

Solar Steam Generator System - The SSG system design is similar to any “kettle boiler” shell and tube heat exchanger in that the hot HTF is circulated through tubes and the steam is produced on the shell side. The SSG system includes heat exchangers for preheating the condensate, superheating the steam, and reheating steam, in addition to the boiler vessels.

HTF Freeze Protection Heat Exchanger - The HTF freezes at temperatures below 54 °F. To eliminate the problem of HTF freezing, steam-fed shell and tube heat exchangers will be used to keep the HTF above 100 °F whenever the facility is offline. As discussed above, the auxiliary boilers will supply the heat for this process as well as performing the function of a startup boiler. This dual-use configuration reduces the number of individual emission sources.

HTF Expansion Tank - Expansion tanks are required to accommodate the volumetric change that occurs when heating the HTF to the operating temperature. Nitrogen will be used to blanket the headspace of the tanks. The nitrogen purge prevents oxidation or contamination of the HTF by reducing its exposure to atmospheric air.

HTF Ullage/Flash System - During plant operation, HTF will degrade into components of high and low boilers (substances with boiling points higher and lower than the HTF). The low boilers are removed from the process as vapors through the system. The high boilers are removed from the process as liquid and sediment through the HTF flash system.

Auxiliary Boiler - The auxiliary boiler will be fueled by natural gas and will provide steam for maintaining steam cycle equipment vacuum over night and for startup. Sealing steam is used to prevent air from entering the steam turbine while the condenser is under vacuum. This method reduces startup time for the plant compared to relying on solar-generated steam as the sealing steam source. Unlike a gas-fired power plant, a solar thermal plant must wait for the sun to rise in the morning to start generating steam and has a finite time to generate electricity (i.e., the number of sunlight hours). If the plant does not have a secondary source of steam, plant startup is delayed (and thus total daily electrical generation reduced), while solar heat alone generates sealing steam and vacuum is established in the condenser. Once the plant begins generating electricity for delivery to the electrical grid, the fired auxiliary boiler is

no longer needed and is held in stand-by mode until auxiliary heat is again required after plant shutdown. The maximum estimated natural gas usage for the auxiliary boiler is expected to be 60 million standard cubic feet per year, for a maximum of 60,000 British thermal units per year.

Major Electrical Systems and Equipment

This section describes the major electrical systems and equipment. Roughly 10 percent of the STG output will be used on-site for plant auxiliary loads such as motors, heaters, control systems, and general facility loads including lighting and heating, ventilation, and air conditioning (HVAC). Some of the power needed for on-site uses will be converted

Power will be generated by the STG (size and generation voltage is depending on the final generator selection) and stepped up by a fan-cooled generator step-up transformer (GSUT). Start-up power will be back-fed through the GSUT. Once the STG is running, it will supply the plant auxiliary power through a generator bus tap and the unit auxiliary transformer (UAT). The plant stand-by electrical power requirements will be back-fed through the GSUT and UAT. There will also be an alternate back-feed power source to the main auxiliary switchgear. This will be key-interlocked with the main auxiliary power source to prevent both sources from operating simultaneously.

Grounding - The electrical system is susceptible to ground faults, lightning, and switching surges that can pose hazards to site personnel and electrical equipment. The station grounding system provides an adequate path to ground to permit the dissipation of current created by these events. The station ground grid will be designed for adequate capacity to dissipate ground current.

Bare conductors will be installed below-grade in a grid pattern throughout the power block area. Each junction of the grid will be bonded together by an exothermic weld or compression connection. Ground resistivity readings will be used to determine the necessary numbers of ground rods and grid spacing to ensure safe step and touch potentials under severe fault conditions. Grounding stingers will be brought from the ground grid to connect to building steel and non-energized metallic parts of electrical equipment.

Electrical Generation - As shown in the key one line diagram, Figure 3.4-7, the Project's STGs will tie into a 230 kV on-site switchyard. The STGs generate electricity at 13.8 kV that will connect to the switchyard at 230 kV via a generator circuit breaker (GCB) and a GSUT. The GCB will be rated at 8000 Amperes (A) and will include 8000/5 A current transformers and 14.4-0.12 kV voltage transformers for generator bus duct and UAT protection. A disconnect switch will be included with the generator circuit breaker for generator disconnect and transformer maintenance. An 8000 A isolated phase bus duct will connect the generator to the GCB and the GCB to the GSUT. The GSUTs will be 150 megavolt-amps (MVA), 230-13.8 kV, two-winding, delta-wye grounded, and fan-cooled (using oil-immersed natural circulation, multi-stage, forced air cooling).

The neutral point of high-voltage winding will be solidly grounded. The main step-up transformer will have metal oxide surge arrestors connected to the high-voltage

terminals and will have manual de-energized ("no-load") tap changers located in high-voltage windings to allow for a nominal voltage plus or minus five percent with a 2.5 percent differential to allow for generator output voltage variations. The GSUT will rest on a concrete pad with a perimeter berm designed to contain the transformer non-polychlorinated biphenyl (PCB) insulating oil in the event of a leak or spill.

The plant site switchyard will be located near the unit two power blocks, as shown in Figure 3.4-3, and will require an overhead 795 thousand circular mils (kcmil) size, steel-reinforced, aluminum conductor unit tie line for the connection to both unit's GSUTs. The switchyard will consist of 230 kV switchyard circuit breakers with 230 kV, 1200 A disconnect switches on each side of the breaker for breaker maintenance. The switchyard breakers will be of the dead tank design with 1200/5 multi-ratio current transformers on each bushing and 230-0.12 kV coupling capacitor voltage transformers located near the breaker control cabinet for protection of the gen-tie line during normal operation of the GSUT and the UAT during back-feed. The switchyard breakers will also be coordinated with the GCBs and 4.16 kV station service switchgear main breakers for bus duct, GSUT, UAT, and unit tie line protection and will also be used for generator synchronizing.

A disconnect switch will be located at the gen-tie line termination within the switchyard for line isolation. The switchyard will be equipped with metering accuracy instrument transformers. Lightning arresters will be provided in the area of the takeoff towers to protect against surges due to lightning strikes. Tubular aluminum alloy bus will be used in the switchyard. Cable connections between the tube bus and equipment will be aluminum or aluminum alloy type cable. Electrical faults will be detected, isolated, and cleared in a safe and coordinated manner as soon as practical to ensure the safety of equipment, personnel, and the public. Protective relaying will meet Institute of Electrical and Electronic Engineers (IEEE) requirements and will be coordinated with the utility.

Fuel Supply and Use - The auxiliary boilers will be fueled by natural gas supplied from a new six-mile, eight-inch pipeline connected to an existing Southern California Gas (SoCal Gas) pipeline located north of I-10. Natural gas delivered to the Project site will flow through a revenue quality flow meter, pressure regulation station, and filtering equipment, and will provide gas to the auxiliary boilers for each 125 MW power plant. Safety pressure relief valves are provided downstream of the pressure regulation valves. The estimated natural gas usage for each auxiliary boiler is 30 million British thermal units per hour (MMBtu/hr) or a total of 60 MMBtu/hr for the Project. The maximum annual natural gas usage is expected to be 60 million standard cubic feet per year (MMSCF/yr) for a maximum of 60,000 MMBtu/year..

Water Supply and Consumptive Requirements - The Project's various water uses include makeup for the circulating water system, makeup for the SSG, water for solar collector mirror washing, service water, potable water, and fire protection water.

Water Treatment - The raw water, circulating water, process water, and mirror washing water all require on-site treatment and this treatment varies according to the quality required for each of these uses. The power plant's design consists of a pre-treatment system upstream of the cooling tower, and a post-treatment system downstream of the

cooling tower. Please see the **Soil & Water Resources** section of this RSA for more detailed analysis of this subject.

Water is cycled in the cooling tower until the concentration of chemical constituents rises to levels where it becomes unusable and it is blown down as a waste stream. The number of cycles undertaken are called cycles of concentration (COC). The number of COCs in the cooling tower is limited by the incoming water chemistry and the behavior of chemistry constituents as the concentration increases. Without any pre-treatment of the raw water ("makeup water") from groundwater on site, the calcium concentration would limit the process to about five COCs due to the potential to form calcium carbonate ($CaCO_3$) scale, and silica would limit the process to 10 COCs due to the formation of silica (SiO_2) and magnesium silicate scale. Because of the limitation of these constituents in the process, pre-treatment of the makeup water is desirable to reduce the quantity of makeup water required. The pre-treatment design for the Project takes into account the relatively high concentrations of chloride and sodium present in the makeup water to the site. As aforementioned, there are several tanks on site which will contain the raw water, treated water, and wastewater, which will have the following capacity:

- Raw Water/Fire Water Storage Tank: 500,000 gallons
- Treated Water Storage Tank: 1,250,000 gallons
- Wastewater Storage Tank: 250,000 gallons

Tanks were sized to provide sufficient water to support operation of the plant during peak operating conditions, as well as provide a 12-hour storage capacity to enable continued operation when a failure interrupts water or wastewater treatment capabilities. The tanks also allow the plant to level and water supply requirements on a 24-hour basis and eliminate midday demand peaks. The Raw Water/Fire Water Storage Tank provides water for plant operation and fire protection, as discussed in the **Worker Safety / Fire Protection** section of this RSA.

Water Source and Quality – Project water for the GSEP will come from pumping groundwater from wells to be installed at the Project site. These wells will pump groundwater from the Bouse Formation and/or underlying Fanglomerate within the Chuckwalla Valley Groundwater Basin. The characteristics and yield of the aquifer that is proposed for the Project water supply, and the long-term effect of pumping of the groundwater system, are discussed in more detail in the **Soil and Water Resources** section of this document.

Steam Cycle Process Water - Makeup water for the steam cycle must meet stringent specifications for suspended and dissolved solids. To meet these specifications, water from the treated water storage tank is sent to a DI makeup water tank, and then processed through a demineralized water makeup system consisting of mixed-bed demineralizers and a 40,000 gallon demineralized water storage tank. Water produced by this system will also be used for the mirror washing described below. Additional conditioning of the condensate and feedwater circulating in the steam cycle is provided by means of a chemical feed system.

To minimize corrosion, an oxygen scavenger for dissolved oxygen control, and an alkaline solution for pH control, are fed into the condensate. To minimize scale formation in the SSG, a solution of disodium phosphate (DSP) and tri-sodium phosphate (TSP) may be fed into each feedwater system. The chemical feed systems include an oxygen scavenger feed tank, an alkaline solution (amine) feed tank, and a phosphate solution feed tank. The feed tanks are provided with two full-capacity metering pumps.

A steam cycle sampling and analysis system monitors the water quality at various points in the plant's steam cycle. The water quality data are used to guide adjustments in water treatment processes and determine the need for other corrective operational or maintenance measures. Steam and water samples are routed to a sample panel where steam samples are condensed and the pressure and temperature of all samples are reduced as necessary. The samples are then directed to automatic analyzers for continuous monitoring of conductivity and pH. All monitored values are indicated at the sample panel and critical values are transmitted to the plant control room. Grab samples are periodically obtained at the sample panel for chemical analyses that provide information on a range of water quality parameters.

Solar Mirror Washing Water - To facilitate dust and contaminant removal, deionized (demineralized) water from the demineralized water storage tank is used to spray clean the solar mirrors on a periodic basis, determined by the reflectivity monitoring program. This operation is generally done at night and involves a water truck spraying deionized water on the mirrors in a drive-by fashion. The deionized water production facilities, already in place for SSG makeup water, will be sized to accommodate the additional solar mirror washing demand of about two acre-feet per year and is shown on the water balance diagrams. Water from the washing operation is expected to mostly evaporate on the mirror surface with no appreciable runoff.

Cooling Systems - Each power plant includes two cooling systems: 1) the steam cycle heat rejection system (*e.g.,* cooling tower); and 2) the closed cooling water system (equipment cooling), each of which is discussed below.

Steam Cycle Heat Rejection System - The cooling system for heat rejection from the steam cycle consists of a surface condenser, circulating water system, and wet cooling tower. The surface condenser receives exhaust steam from the LP section of the STG and condenses it to liquid for return to the SSG. The surface condenser is a shell-and-tube heat exchanger with wet, saturated steam condensing on the shell side and circulating water flowing through the tubes to provide cooling. The warmed circulating water exits the condenser and flows to the cooling tower to be cooled and reused.

The circulating water is distributed among multiple cells of the cooling tower, where it cascades downward through each cell and then collects in the cooling tower basin. The mechanical draft cooling tower employs electric motor-driven fans to move air through each cooling tower cell. The cascading circulating water is partially evaporated, and the evaporated water is dispersed to the atmosphere as part of the moist air leaving each cooling tower cell. As discussed in the **Visual Resources** section of this document, because of climatic conditions at the site, visible moisture plumes are expected to occur

relatively infrequently and largely in winter months, and no need is expected for a plume-abated cooling tower.

The circulating water is cooled primarily through partial evaporation and secondarily through heat transfer with the air. The cooled circulating water is pumped from the cooling tower basin back to the surface condenser and auxiliary cooling water system.

Auxiliary Cooling Water System - The auxiliary cooling water system uses water from the cooling tower for the purpose of cooling equipment including the STG lubrication oil cooler, the STG generator cooler, steam cycle sample coolers, large pumps, etc. The water picks up heat from the various equipment items being cooled and rejects the heat to the cooling tower.

Waste Management - Project wastes include wastewater, non-hazardous solid waste, hazardous solid waste, and hazardous liquid waste. Project waste streams and management details are discussed in the **Soil & Water Resources** and **Waste Management** sections of this document.

Wastewater - Wastewater would be segregated into two separate collection systems, one for industrial streams and one for sanitary wastes. Industrial wastewater from both the pre-treatment and post-treatment systems will be piped to two, 30-acre evaporation ponds for disposal. There are three primary and one occasional waste streams discharging into the evaporation ponds:

- Pre-cooling tower water treatment MMF waste stream;
- Post-cooling tower water treatment MMF waste stream;
- Post-cooling tower water treatment; and,
- 2nd stage Reversed Osmosis (RO) waste stream.

Occasionally, storm water may accumulate in the proposed Land Treatment Unit (LTU) that will be used to treat soil affected by spills of HTF, and will be transferred to the evaporative ponds.

On an annual average, blowdown to the evaporation ponds will be approximately 90,000 gallons per day for each unit, increasing to approximately 140,000 gallons per day for each unit during peak summer conditions. The Project's sanitary system will collect wastewater from sanitary facilities such as sinks and toilets. This waste stream will be sent to an on-site sanitary waste septic system designed and permitted in accordance with standards stipulated in the **Waste Management** section of this RSA.

Evaporation Ponds - The ponds will be designed and permitted as Class II Surface Impoundments in accordance with Colorado River Regional Water Quality Control Board (CRRWQCB) requirements, as well as the requirements of the California Integrated Waste Management Board (CIWMB). Multiple ponds are planned to allow plant operations to continue in the event a pond needs to be taken out of service for some reason, *e.g.,* needed maintenance. Each pond will have enough surface area so the evaporation rate exceeds the cooling tower blowdown rate at maximum design conditions and annual average conditions.

The average pond depth is eight feet and residual precipitated solids will be removed approximately every seven years to maintain a solids depth no greater than approximately three feet for operational and safety purposes. The precipitated solids will be sampled and analyzed to meet the characterization requirements of the licensed receiving disposal facility.

On-site Bioremediation Land Treatment Unit - The Project will include a bioremediation LTU to treat soil impacted by incidental spills and leaks of HTF at various concentrations. The unit will be designed and permitted as a Class II LTU in accordance with CRRWQCB and CIWMB requirements. The LTU will cover an area of approximately 600 feet by 725 feet, including the staging area, and will cater for both 125 MW units. The LTU will be constructed with a prepared base consisting of two feet of compacted, low permeability, lime treated material and be surrounded on all sides by a minimum two foot high compacted earthen berm with slopes of approximately 3:1 (horizontal:vertical). Based on available operation data from other sites, it is anticipated approximately 750 cubic yards (on average) of HTF-affected soil may be treated per year. Larger or smaller quantities could be generated during some years, depending on the frequency and size of leaks and spills.

Other Non-Hazardous Solid Waste - Construction, operation, and maintenance of the GSEP will generate non-hazardous solid wastes typical of power generation or other industrial facilities (see the **Waste Management** section of this RSA). These wastes include scrap metal and plastic, insulation material, paper, glass, empty containers, and other miscellaneous solid wastes. These materials will be disposed by means of contracted refuse collection and recycling services.

Hazardous Solid and Liquid Waste - Small quantities of hazardous wastes will be generated during Project construction and operation. Hazardous wastes generated during the construction phase will include substances such as paint and primer, thinners, and solvents. Hazardous solid and liquid waste streams generated during Project operations include substances such as used hydraulic fluids, oils, greases, filters, etc., as well as spent cleaning solutions and spent batteries. To the extent possible, both construction and operation-phase hazardous wastes will be recycled, as detailed in the **Hazardous Management** section of this RSA (which also includes additional data on hazardous materials that will be used during construction and operation, including quantities, associated hazards and permissible exposure limits, storage methods, and special handling precautions. Hazardous materials that will be used during construction include gasoline, diesel fuel, oil, lubricants, and small quantities of solvents and paints. All hazardous materials used during construction and operation will be stored on site in storage tanks, vessels and containers that are specifically designed for the characteristics of the materials to be stored; as appropriate, the storage facilities will include the needed secondary containment in case of tank/vessel failure.

Engineering Controls - Engineering controls help to prevent accidents and releases (spills) from moving off site and affecting communities by incorporating engineering safety design criteria in the design of the project. The engineered safety features proposed by the applicant for use at the GSEP project include:

- storage of small quantity hazardous materials in original, properly labeled containers;
- construction of secondary containment areas surrounding each of the bulk hazardous materials storage areas, designed to contain accidental releases that might happen during storage or delivery plus the volume of rainfall associated with a 25-year, 24-hour storm;
- physical separation of stored chemicals in isolated containment areas in order to prevent accidental mixing of incompatible materials, which could result in the evolution and release of toxic gases or fumes;
- installation of a fire protection system for hazardous materials storage areas; and
- continuous monitoring of HTF piping system by plant staff and by automatic pressure sensors designed to trigger isolation valves if a leak is detected.

Air Emissions Control and Monitoring - Installation and operation of the Project will result in a change in the emissions signature for the site. Criteria pollutant emissions from the proposed auxiliary boilers, fire pump engines, emergency generator engines, and cooling towers are discussed in the **Air Quality** and **Public Health** section of this analysis. Operation of the Project will result in emissions to the atmosphere of both criteria and toxic air pollutants from the proposed auxiliary boilers, fire pump engines, emergency generator engines, and cooling towers, and fugitive losses from the HTF system. Construction-related emissions are associated with site disturbance resulting from site preparation and with the typical emissions and associated construction-related activities encountered at any construction site.

Fire Protection - Fire protection systems are provided to limit personnel injury, property loss, and Project downtime resulting from a fire. The systems include a fire protection water system and portable fire extinguishers.

Each 125 MW power plant's fire protection water system will be supplied from a dedicated 360,000-gallon portion of the 500,000-gallon raw water storage tank located on the plant site. One electric and one diesel-fueled backup firewater pump, each with a capacity of 3,000 gallons per minute, will deliver water to the fire protection water-piping network for each plant. A smaller electric motor-driven jockey pump will maintain pressure in the piping network. If the jockey pump is unable to maintain a set operating pressure in the piping network, the diesel fire pump starts automatically.

The piping network will be configured in a loop so a piping failure can be isolated with shutoff valves without interrupting the supply of water to a majority of the loop. The piping network will supply fire hydrants located at intervals throughout the power plant site, a sprinkler deluge system at each unit transformer, HTF expansion tank and circulating pump area, and sprinkler systems at the STG, and in the operations and

administration buildings. Portable fire extinguishers of appropriate sizes and types will be located throughout the plant site.

Fire protection for the solar field will be provided by zoned isolation of the HTF lines in the event of a rupture that results in fire. As vegetation or other combustible materials will not be allowed in the solar field, the HTF will be allowed to extinguish itself naturally, since the remainder of the field is of nonflammable material (aluminum, steel, and glass) (please see the **Worker Safety / Fire Protection** section of this document for additional discussion of on- and off-site fire protection measures).

Plant Auxiliary Systems

The following plant auxiliary systems control, protect, and support the power plant and its operation.

Distributed Control System - The Distributed Control System (DCS) provides control, monitoring, alarm, and data storage functions for power plant systems. These include:

- Control of the STG, SSG system, and balance-of-plant systems in a coordinated manner;
- Monitoring of operating parameters from plant systems and equipment;
- Visual display of the associated operating data to control operators and technicians;
- Detection of abnormal operating parameters and parameter trends;
- Provision of visual and audible alarms to apprise control operators of such conditions; and,
- Storage and retrieval of historical operating data.

The DCS is a microprocessor-based system. Redundant capability is provided for critical DCS components such that no single component failure will cause a plant outage. The DCS consists of the following major components:

- Computer monitor-based control operator interface (redundant);
- Computer monitor-based control engineering work station;
- Multi-function processors (redundant);
- Input/output processors (redundant for critical control parameters);
- Field sensors and distributed processors (redundant for critical control parameters);
- Historical data archive; and,
- Printers, data highways, data links, control cabling, and cable trays.

The DCS is linked to the control systems furnished by the STG supplier and the solar field controls. These data links provide STG control, monitoring, alarm, and data storage functions via the control operator interface and control technician workstation of the DCS.

Lighting System - The Project's lighting system will provide operations and maintenance personnel with illumination in both normal and emergency conditions. The system will consist primarily of AC lighting, but will include DC lighting for activities or emergency egress required during an outage of the plant's AC electrical system. The lighting system will also provide AC convenience outlets for portable lamps and tools. Lighting will be designed to provide the minimum illumination needed to achieve safety and security objectives and will be shielded and oriented to focus illumination on the desired areas and minimize additional nighttime illumination in the site vicinity.

Cathodic and Freeze Protection Systems - Cathodic protection systems protect against electrochemical corrosion of underground metal piping and structures. Underground metal piping structures will have cathodic protection as necessary based on soil conditions. Freeze protection systems (heat tracing) will be employed to protect small water and condensate piping systems that cannot be easily drained. Also due to the high freezing temperature of the solar field's HTF (54°F), steam-fed HTF freeze protection heat exchangers will be provided to protect the system during the night hours and colder months.

Service Air and Instrument Air Systems - The service air system supplies compressed air to hose connections located at intervals throughout the power plant. Compressors deliver compressed air at a regulated pressure to the service air-piping network. The instrument air system provides dry, filtered air to pneumatic operators and devices throughout the power plant. Air from the service air system is dried, filtered, and pressure regulated prior to delivery to the instrument air-piping network.

HTF Leak Detection - Leak detection of HTF will be accomplished in a combination of ways. Small leaks, possibly at ball joints or other connections, will be located based on daily inspection of the solar field. Those small leaks can then be corrected via repacking of joints or valves or by minor repairs if needed. The ability to isolate loops and sections of the field will allow for quick repairs. In order to identify and react to larger sudden leaks quickly, a combination of remote pressure sensing equipment and remote operating valves will be put in place for isolation of large areas. Please see the **Hazardous Materials** section of this RSA, and Condition of Certification **HAZ-4** for more details.

POWER PLANT CIVIL/STRUCTURAL FEATURES

The following describes the civil/structural features of the GSEP, as illustrated in the power block arrangements presented in **Project Description Figure 3.** The power plant will be designed in conformance with 2007 California Building Code and the applicable wind and seismic criteria for site location. As noted earlier, sensitive Project facilities (*e.g.,* power block, evaporation pond) will be placed at specific on-site locations that avoid mapped AP fault zones.

SSG System, STG and Associated Equipment - The SSG system, STG, and condenser will be located outdoors and supported on reinforced concrete mat foundations. The STG foundation will include a reinforced concrete pedestal that supports the STG above the surface condenser. The one step-up transformer and GSUT will be supported on reinforced concrete mat foundations. Balance-of-plant

(BOP) mechanical and electrical equipment will be supported on individual reinforced concrete pads. BOP components/materials include piping, valves, cables, switches, etc. that are not included with major equipment and are generally installed or erected onsite.

Solar Array Support Structures - Each solar collector array will be supported by structures (stands) that connect the parabolic troughs to the drive mechanism. Each array will be supported by multiple individual foundations with a foundation located approximately every 40 feet along the array. Foundation design will be based on site-specific geotechnical conditions to ensure the solar array stands are able to support all loading conditions (including wind loading) at the Project site.

Buildings - The GSEP will include a common administration building and warehouse between the two 125 MW power plants. A control building will be located in each power block. The design and construction of the administration building and warehouse will be consistent with normal building standards. Other plant site "buildings" will include the water treatment building, as well as a number of pre-engineered enclosures for mechanical and electrical equipment. Building columns are supported on reinforced concrete mat foundations or individual spread footings and the structures rest on reinforced concrete slabs. The total square footage of the various Project buildings and pre-engineered enclosures (*e.g.,* control rooms, administration building, warehouse, electrical equipment enclosures, fire pumps, and diesel generators) is approximately 39,000 square feet.

Water Storage Tanks - There will be a number of covered water tanks on site for each 125 MW power plant. For each plant, there will be a 500,000-gallon raw water storage tank for short-term backup cooling water supply, with a portion (360,000 gallons) dedicated to the plant's fire protection water system; a 1,250,000-gallon treated water storage tank; and a 250,000 waste water storage tank. There also will be a 40,000-gallon storage tank for storage of demineralized water. Water storage tanks will be vertical, cylindrical, field-erected steel tanks supported on foundations consisting of either a reinforced concrete mat or a reinforced concrete ring wall with an interior bearing layer of compacted sand supporting the tank bottom.

Roads, Fencing, and Security - The GSEP site is located in a remote section of eastern Riverside County, about six miles north of I-10, and approximately 25 miles west of Blythe. All vehicular traffic approaching the site will use I-10. Only a small portion of the overall plant site will be paved, primarily the site access road and portions of each power block (paved parking lot and roads encircling the STG and SSG areas). The entire site will be fenced appropriately to restrict public access during construction and operations. In order to ensure that the facility site is not the target of unauthorized access, staff has required the implementation of site security measures that are discussed in the **Hazardous Material Management** section of this document. These measures would provide appropriate levels of security to protect electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks.

Site Drainage - As discussed in the **Soil & Water Resources** section under the Drainage Erosion and Sediment Control Plan (DESCP), natural drainage across the site is episodic, shallow, and occurs over a broad area primarily as sheet flow or in shallow washes. A comprehensive site drainage plan was developed in consultation with other

public agencies, including CDFG, which resulted in a determination on jurisdiction of state waters (discussed in the **Biological Resources** sections of this document).

The main drainage channels and associated diversion berms of the GSEP will divert flows downstream of the site following their existing drainage paths, causing no impact to the site. The channels and diversion berms engineering specifics will allow passage of anticipated flows and entrained sediment volumes; will be armored as necessary for erosion protection using natural gravel derived during site grading activities; and will be maintained periodically or after major storm events as needed to sustain their proper function. The main purposes of the diversion are to prevent interaction with off-site storm water and on-site storm water which will:

- Allow natural groundwater recharge of the off-site storm water with no contact with the changed flow conditions of the on-site water.
- Protect the site infrastructure from flash flood events, which have the potential to damage the solar parabolic troughs.
- Control treatment of the on-site flows from the solar collector array (location of HTF within the solar parabolic troughs).
- Protect the site from upstream sediment loading.
- Control on-site flows in detention basins to ensure there is no increase in post developed flow discharging from the site, minimize the impact on downstream drainage features (lake playas, etc).
- Maximize the developable area within the solar field.

On-site storm water management for the completed facility will be provided through the use of source control techniques, site design, and treatment control. The Project will employ a comprehensive system of management controls, including site-specific Best Management Practices (BMPs), to minimize storm water contact with contaminants and thus minimize pollutants in storm water. These management controls include:

- Erosion Control
- Sediment Control
- Wind Erosion
- Tracking Control
- Non-stormwater discharges
- Waste Management

Earthwork - Solar fields have fairly stringent grading requirements as parabolic troughs must be almost level along their troughs and grades perpendicular to the troughs are generally benched to two percent or less. Under pre-developed conditions, each 125 MW module generally slopes from the northeast to the southwest. Grading for post-developed conditions will slightly modify the existing contours to provide a surface level appropriate for the parabolic troughs. The preliminary grading is designed to ensure the run-off from solar fields is directed into the appropriate drainage channel, and the power

block, evaporation ponds, and land farm units are protected in the 100-year, 24-hour storm event.

TRANSMISSION FACILITIES

Interconnection to Substation - The Genesis switchyard will contain three breakers and three line takeoff structures. It will have space for a future breaker and line takeoff structure. Air insulated structures will be utilized giving the switchyard a size of approximately 270 feet by 400 feet. The switchyard and interconnections will be built for 230 kV and will operate at that nominal voltage. Instrument transformers (current and capacitive voltage transformers) will be included for protection. Shield wires and lightning arrestors will be included to protect substation equipment and personnel against lightning strikes. The switchyard arrangement is shown in the power block layout general arrangement for unit two.

The generated electrical power from the Project switchyard will be transmitted through a generation-tie (gen-tie) line that will be routed in a southeasterly ROW eventually connecting to the Southern California Edison (SCE) 500-230 kV Colorado River substation via the Blythe Energy Project Transmission Line (BEPTL).

Interconnection Design Considerations - The gen-tie line will be constructed for operation at 230kV, the nominal operating voltage of the regional transmission system. The use of 230 kV as the targeted design voltage is consistent with the industry use of the 230-kV term to describe the nominal voltage for this class of system. Each circuit will be supported by mono-pole structures at approximately 800 feet intervals with final heights as determined during detailed design. The lines will be insulated from the poles using porcelain insulators engineered for safe and reliable operation at a worst-case voltage of 241.5 kV (nominal, plus five percent). Shield wires will be included along the length of the lines to protect against lightning strikes (see the **Transmission Line Safety Nuisance** and T**ransmission System Engineering** sections of this RSA). The pole designs will be engineered to provide conceptual design limits for purposes of the electromagnetic field (EMF) studies and in accordance with the current Blythe-Julian Hinds structures.

Transmission System Upgrades - The Project will require an interconnection upgrade at the Colorado River substation, which includes its expansion by 40 acres to accommodate new generation from GSEP and Solar Millennium Blythe. Six additional transmission poles will also be required to connect GSEP electricity from the BEPTL into the Colorado River Substation. These upgrades will be described and analyzed in a forthcoming report to be published by the end of June, 2010 entitled Transmission System Engineering (TSE) Appendix A.

Colorado River Substation Expansion (TSE Appendix A) – This project involves expanding the already approved 500 kV SCE switchyard into a full 500/220 kV substation on approximately 90 acres of land. The expansion project would involve site preparation by clearing existing vegetation and grading, and may involve redirecting surface flows around one side of the substation. No final drainage or grading plans have yet been prepared, but it may be necessary to redirect surface water flow around one side of the substation. An approximately 10-acre staging area adjacent to the expansion

site may be necessary for construction. Although detailed engineering, grading and drainage plans are not yet available, it is estimated that the total area subject to permanent disturbance from construction of the substation expansion would be approximately 65 acres (45 acres for substation grading, 20 acres for drainage/side slopes), plus temporary disturbance resulting from a 10-acre staging area.

Transmission Downstream – transmission reliability impacts, and appropriate mitigation, have not been fully identified at this point in terms of the forthcoming Phase II Interconnection study of 2,200 MW of generation. However, 9,690 MW of generation in the Genesis cluster Phase I Interconnection study indicated that the project interconnection to the grid would not result in downstream transmission impacts. Although significant, unmitigated impacts are not anticipated, with the final Large Generator Interconnection Agreement, staff will have certainty in this respect (please see the **Transmission System Engineering** section for further details).

PROJECT CONSTRUCTION

Power Generation Facility - Major milestones of the planned Project construction schedule are as follows:

- Begin construction Unit 1: Month 1
- Startup and test Unit 1: Month 21
- Commercial operation Unit 1: Month 25
- Begin construction Unit 2: Month 12
- Startup and test Unit 2: Month 33
- Commercial operation Unit 2: Month 39

Project construction is expected to occur over a total of 39 months. Project construction will require an average of 650 employees over the entire construction period, with labor requirements peaking at approximately 1100 workers in Month 23 of construction. The construction workforce will consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The total number of workers need for GSEP construction by craft during the peak month (Month 23):

Trade	Total # of Workers for Project Construction by Craft – Month 23
Insulators	24
Operating Engineers	60
Laborer	96
Teamsters	38
Painter	15
Carpenter	44
Solar Field Craft	305
Pipe Fitter	200
Electrician	105
Cement Mason	4
Ironworker	70
Millwright	22
Construction Staff	92

Temporary construction laydown and parking areas will be provided within the power plant site. Construction power will be provided by the local distribution system and routed to the site along wood poles within the 230 kV ROW. Due to the size of the plant site, the solar field laydown area will be relocated periodically as the solar field is built out. The construction sequence for power plant construction includes the following general steps:

Site Preparation: this includes detailed construction surveys, mobilization of construction staff, grading, and preparation of drainage features. Grading for the solar field, power block, and rerouted wash will be completed during the first nine months of the construction schedule.

Foundations: this includes excavations for large equipment (STG, SSG, GSUT, cooling tower, etc.), footings for the solar field, and ancillary foundations in the power block.

Major Equipment Installation: once the foundations are complete, the larger equipment will be installed. The solar field components will be assembled in an on-site erection facility and installed on their foundations. Equipment and materials will be delivered to the Project plant site by truck; large components (*e.g.,* STG) will be brought by rail to a rail siding in the town of Blythe and then are expected to be trucked to the site on I-10.

BOP: with the major equipment in place, the remaining field work will be piping, electrical, and smaller component installations.

Testing and Commissioning: testing of subsystems will be done as they are completed. Major equipment will be tested once all supporting subsystems are installed and tested. ‘

Civil Works - The construction sequence for civil works includes the following general steps:

Site Disturbance: Once all areas are appropriately staked and signed and access to the site has been established, grading activities will occur over an extensive portion of the site. Grading will commence with rough grading activities, including grubbing, clearing, moisture conditioning, bulk grading, and initial compaction. The first ground-disturbing activities to take place will be the initial clearing and grading to prepare the site for the storm water drainage, construction, and equipment foundation pads. Temporary drainage ditches and berms will also be designed around construction work areas, soil stockpile areas, and excavation areas to minimize the amount of potential pollutant or sediment-laden surface water runoff.

Site Grading: The solar pad grading of the site will have an average slope of one to three percent on the north-south direction. Each solar pad will be graded with the intent of balancing the cut-and-fill as much as possible to minimize earth movement on the site. Drainage diversion channels and protective berms will also be developed with a balance of cut and fill earthwork.

Site Drainage: The post-development sediment/retention basin at the discharge points will provide storm water pollution prevention BMP controls, along with retention time to reduce the peak off-site discharge to match pre-development conditions. The road berm will also be constructed to provide site protection from storm water run-on during a 100-year return storm event. The toe of the western protective berm slope may be armored with soil cement cover and rip rap to provide for slope erosion protection during a heavy storm event.

Internal Road System: A primary access road will be constructed to the power block area. This road will be 24 feet wide and paved with approximately 3,000 tons of imported asphalt concrete material. Auxiliary roads will be 24 feet wide and use compacted native materials or gravel surface.

Restoration of Temporary Disturbance: All temporarily disturbed areas will be restored to their preconstruction conditions, as required by the BLM. Temporary access roads used during construction will also be regraded and restored to pre-existing function and grade. BLM-approved seed mixes will be applied to temporarily disturbed areas, as required. No fertilizer will be used during stabilization or rehabilitation activities unless authorized by the BLM. No vegetation will be restored or encouraged within the solar field because of the fire hazard. Vegetation within the LTU area will be controlled to prevent containment from being compromised. When construction of storm water management structures is complete, contours will be carefully restored to the extent feasible.

Generator Tie Line - The gen-tie line will be constructed with crews working continuously along the ROW, with construction of the entire gen-tie line requiring a peak workforce of approximately 34 workers. Gen-tie line construction will include the following activities:

- Preparation of marshalling yards
- Access road and spur road construction
- Clearing and grading of pole sites

- Foundation preparation and installation of poles
- Conductor installation
- Cleanup and site reclamation

Various construction activities would occur during the construction process with several construction crews operating simultaneously at different locations. The following subsections describe in more detail the construction activities associated with the Project gen-tie line.

Marshalling Yards: Construction staging/laydown and parking areas are proposed for two locations: 1) within the Project site, and 2) at the Wiley Well Rest area. Construction materials such as concrete, wire and cable, fuels, and small tools and consumables would be delivered to the staging/laydown areas by truck. Mobile trailers or similar suitable facilities (for example, modular offices) would be used for construction offices to be located at the Project staging/laydown areas.

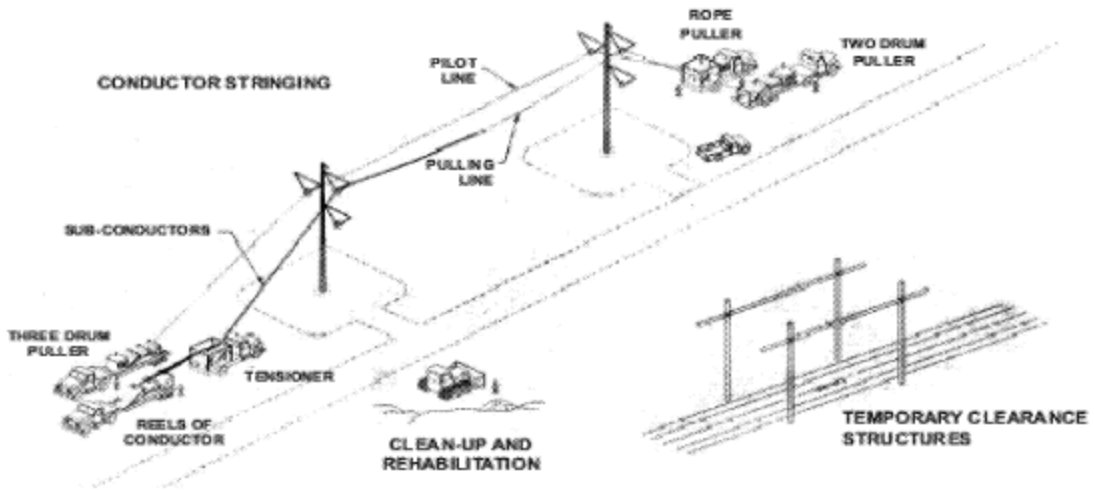
Road Work: The construction, operation, and maintenance of the proposed gen-tie line would require that heavy vehicles access structure sites along the road. The Project proposes to use the newly constructed site access road and Wiley Well Road for all construction, operation, and maintenance activities associated with the gen-tie line. If required, new spur roads, approximately 14 feet wide and averaging 70 feet in length, would be constructed from the access roads to the structure sites. Each spur road would lead to a construction pad for a pole structure.

Pole Pads: At each site, a work area would be required for the structure footing location, structure assembly, and the necessary crane maneuvers. The work area would be cleared of vegetation only to the extent necessary and the construction pad would be leveled to facilitate the safe operation of equipment such as construction cranes.

Pole Erection: Transmission line pole structure foundation excavations would be made with power drilling equipment. A vehicle-mounted power auger or backhoe would be used to excavate for the structure foundation. Although not expected, in some instances blasting could be necessary because of specific geologic conditions. In the unlikely event blasting is necessary, conventional or plastic explosives would be used. Safeguards (*e.g.* blasting mats) would be employed when adjacent areas require protection. ‘

Conductor Installation: Typical conductor stringing activities are illustrated below. Crossing structures would consist of H-frame wood poles placed on either side of an obstacle. These structures would prevent ground wire, conductors, or equipment from falling on an obstacle and would be removed following the completion of conductor installation. Equipment for erecting the crossing structures would be the same as the equipment discussed above for transmission pole installation. Crossing structures may not be required for small roads or other areas where suitable safety measures such as barriers, flagmen, or other traffic controls could be used.

Pilot lines would be pulled (strung) from structure to structure and threaded through the stringing sheaves at each structure. This phase of work may be accomplished through the use of helicopters to minimize or otherwise eliminate the need to traverse the ROW along the ground from structure to structure. Following the pilot lines, a larger diameter stronger line would be attached to the conductors to pull them onto the structures. This process would be repeated until the ground wire or conductor is pulled through all sheaves.



Source: AFC, page 3-30.

Pulling Sites: The shield wire and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment, approximately one mile apart. Tensioners and/or pullers, line trucks, wire trailers, and tractors needed for stringing and anchoring ground wire or conductor would be necessary at each pulling site. The tensioner, in concert with the puller, would maintain tension on the shield wires or conductors while they would be pulled through the structures. There will be approximately 25 pulling sites required to install the conductors along this segment of the gen-tie line. The sites will be accessed from the Project access roads or Wiley's Well Road.

Clean up and Site Reclamation: Construction sites, material storage yards, and access roads would be kept in an orderly condition throughout the construction period. Approved enclosed refuse containers would be used throughout the Project. Refuse and trash would be removed from the sites and disposed in an approved manner. Oils or chemicals would be hauled to a disposal facility authorized to accept such materials. Open burning of construction trash would not be acceptable.

The post-construction ROW would be restored as required by the BLM. All practical means would be made to restore the land to its original contour and restore the natural drainage patterns along the ROW. Because re-vegetation would be difficult in many areas of the Project because of low amounts of precipitation, it would be important to minimize disturbance during construction.

Natural Gas Pipeline - Construction of the gas pipeline will be the responsibility of SoCal Gas (SCG) and is expected to take three to six months with a peak workforce of

approximately 46 workers. Provisions for construction contractor employee parking for the pipeline construction will be accommodated by the Applicant at the plant site, except for those supervisory contractor employee and agency inspection vehicles which must be temporarily parked along the route while construction takes place. Most major pieces of pipeline construction equipment will remain along the pipeline ROW during construction with storage and staging of equipment and supplies either located at the Project plant site or other acceptable site selected by SCG at the time construction is underway. Excavated earth material would be stored within the construction ROW. During nonworking hours, any open trench will be covered with wood or other material of sufficient strength to support wildlife.

Trenching: The optimal trench will be approximately 48 inches wide and 4 to 10 feet deep. With loose soil, a trench up to eight feet wide at the top and three feet wide at the bottom may be required. The trench depth will provide a minimum cover of 36 inches.

Stringing: The pipeline components will be staged along the trench on wooden skids in preparation for installation.

Installation: Installation consists of bending, welding, and coating the weld-joint areas of the pipe after it has been strung, padding the ditch with sand or fine spoil, and lowering the pipe string into the trench following non-destructive testing of all welds.

Backfilling: consists of returning spoil back into the trench around and on top of the pipe, ensuring the surface is returned to its original grade or level. The backfill will be compacted to protect the stability of the pipe and minimize subsequent subsidence.

Trenchless construction methods may be used for short crossings under existing water lines or other buried pipelines. Boring pits will be dug on each side of the crossing to accommodate the process. Cleanup consists of restoring the surface of the roadway or ROW by removing any construction debris, grading to the original grade and contour, and revegetating or repairing where required (see the **Biological Resources** section of this document for more details).

FACILITY OPERATION

The Project will have a moderate sized workforce during operation. Specifically, it is estimated that a permanent workforce of 40 to 50 full time equivalent personnel will be needed to staff the facility 24 hours per day/seven days per week. When the solar facility is not operating (i.e. generating electricity), personnel will nonetheless be present for necessary maintenance, start-up, and/or site security.

FACILITY CLOSURE

Facility closure can occur on either a temporary or permanent basis. Temporary closure is a cessation of facility operations for a period of time greater than would be required for routine maintenance, overhaul, or replacement of major plant equipment. Temporary closures may be caused by damage to the facility from events such as fire, earthquake, or other natural occurrences, or by short-term economic considerations.

Permanent closure is a cessation of facility operations with no intent to restart. Permanent closure may result from a combination of facility age and economic considerations, or from damage considered beyond repair or other reasons. Temporary and permanent facility closures are both discussed in detail in the **General Conditions** section of this Revised Staff Assessment.

Temporary Closure - In the case of a temporary closure, security for the GSEP facilities will be maintained on a 24-hour basis and the Energy Commission and other responsible agencies will be notified. The course of action that will be followed will depend on whether or not the temporary closure involves a release of hazardous materials.

If there is no actual or threatened release of hazardous materials, a contingency plan will be implemented for the temporary halting of facility operations. The purpose of this contingency plan, to be developed prior to the beginning of operations, is to ensure compliance with all applicable Laws, Ordinances, Regulations, and Standards (LORS) and appropriate protection of public health, safety, and the environment. Depending on the expected duration of the temporary shutdown, the contingency plan may include the draining and proper disposal of chemicals from storage tanks and other facility equipment, the safe shutdown of all plant equipment, and various other measures to protect onsite workers, the public, and the environment.

If the temporary closure involves an actual or threatened release of hazardous materials to the environment, procedures will be implemented as provided in the **Hazardous Materials** section of this Revised Staff Assessment. Procedures will include, but not be limited to, the following:

- Measures to control the release of hazardous materials;
- Requirements for notifying the appropriate agencies and the public;
- Emergency response procedures; and,
- Training requirements for Project personnel in hazardous materials release response and control.

Once the hazardous materials release has been resolved, temporary closure will proceed as described above for temporary closure without a hazardous materials release.

Permanent Closure - The planned operational life of the GSEP is 30 years, but the Project facility conceivably could operate for a longer or shorter period depending upon economic considerations or other circumstances. For example, if the Project facility remains economically viable, it could operate for more than 30 years, which would defer environmental impacts associated with closure and with the development of replacement power generating facilities. However, if the facility were to become economically non-viable before 30 years of operation, it could be closed permanently at an earlier time.

Regardless of when permanent closure occurs, a decommissioning plan specifying the appropriate closure procedures will be developed and implemented. As in the case of a

temporary closure, security for the Project facility will be maintained on a 24-hour basis. During permanent closure, the Energy Commission and other responsible agencies will be notified of the decommissioning schedule and plans.

The procedures provided in the decommissioning plan will be designed to ensure public health and safety, environmental protection, and compliance with applicable LORS. Prior to the beginning of permanent closure activities, the decommissioning plan will be submitted to the Energy Commission's Compliance Project Manager for review and approval.

Depending on conditions at the time of closure, the closure measures may range from extensive "mothballing" to the complete removal of Project equipment and other structures. Proposed decommissioning measures for the power plant and all associated facilities constructed as part of the Project, designation of equipment and appurtenances to be removed or that may remain in place, as applicable.

- Activities necessary for site reclamation;
- Provisions for recycling facility components, collection and disposal of wastes, and resale of unused chemicals back to suppliers or other parties;
- Decommissioning alternatives other than full restoration of the site;
- Costs associated with the proposed decommissioning and reclamation activities and the source of funds to implement these activities; and,
- Conformance with applicable LORS and with local/regional plans.

As it is not possible to predict at present the conditions that will exist at the time decommissioning decisions must be made, decommissioning details will be developed and provided to the Energy Commission when the time for permanent closure is closer and more information is available. Please see the **General Conditions** section of this Revised Staff Assessment for more details on this process.

If the evaporation ponds or LTU require temporary closure, the Closure and Post-Closure Maintenance Plan shall be implemented. A Preliminary Closure and Post-Closure Maintenance Plan for both waste management units will be submitted to the Colorado River Regional Water Quality Control Board with the application for a Report of Waste Discharge (RoWD) (please see the **Waste Management** section of this RSA for a more detailed discussion).

ALTERNATIVES RETAINED FOR ANALYSIS

Three alternatives are retained for analysis within each discipline's section:

- Reduced Acreage Alternative
- Dry Cooling Alternative
- No Project/No Action Alternative

REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra (applicant). This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

The Reduced Acreage Alternative would have a net generating capacity of approximately 125 MW and would occupy approximately 900 acres of land. This alternative would retain 50 percent of the proposed project's generating capacity, and would affect 50 percent of the land affected by the proposed project. Specifically, the alternative would retain the Unit 1 solar field, including the construction parking, construction trailers, and temporary construction laydown area; the administration building and warehouse; the solar collector assembly area; the western evaporation pond area (approximately 24 acres); and the land farm area (approximately 10 acres). The alternative would require relocating the switchyard from the Unit 2 power block to the Unit 1 power block. The eastern evaporation pond area (approximately 24 acres) that corresponds with Unit 2 would not be included in the Reduced Acreage Alternative. This area could be used for the relocated gas yard if needed.

Similar to the proposed project, the Reduced Acreage Alternative would transmit power to the grid through the BEPTL and the Colorado River Substation. It would require infrastructure, including groundwater wells, transmission lines, road access, an administration building, and evaporation ponds. The required infrastructure and transmission line for the Reduced Acreage Alternative would follow the routes defined for the proposed project, even though Unit 1 would not be constructed. The linear facilities would require approximately 90 acres. The gas pipeline would be approximately 1 mile longer than for the proposed project.

Dry cooling is being evaluated as an alternative to the proposed project and could also be used with this configuration; however, if wet cooling were retained, approximately 822 acre-feet per year would be pumped during operations.

DRY COOLING ALTERNATIVE

Description of the Process and Equipment Required

There are two types of dry cooling systems: direct dry cooling and the less-used indirect dry cooling. In both systems, fans blow air over a radiator system to remove heat from the system via convective heat transfer (instead of once-through cooling or evaporative heat transfer). In the direct dry cooling system, also known as an air-cooled condenser (ACC), steam from the steam turbine exhausts directly to a manifold radiator system that rejects heat to the atmosphere, condensing the steam inside the radiator. Direct dry cooling is analyzed as an alternative to the wet cooling proposed by NextEra for the Genesis Solar Energy Project (GSEP).

Dry cooling is the best choice of cooling technologies for a steam power plant to conserve water and minimize wastewater. However, this technology can create both environmental and economic concerns, depending on the location and specific situation. These concerns are evaluated for the GSEP site in each section of this Revised Staff Assessment.

Advantages and Disadvantages of Dry Cooling

The following is a general list of the general advantages and disadvantages of dry cooling.

Advantages of Dry Cooling Systems

- Dry cooling allows a power plant location to be independent of a water source. It has essentially no water intake or water discharge requirements.
- Dry cooling minimizes the use of water treatment chemicals.
- Dry cooling minimizes the generation of liquid and solid wastes.
- Dry cooling does not generate visible plumes that are commonly associated with wet cooling towers.
- Dry cooling eliminates impacts to aquatic biological resources.
- Dry cooling eliminates the need for discharge permits.
- Dry cooling eliminates the need for disturbance of wetland/aquatic substrate habitat.

Disadvantages of Dry Cooling Systems

- Dry cooling requires air-cooled condensers that could have negative visual effects.
- Compared to once-through cooling, dry cooling requires the disturbance of a larger area for the air-cooled condensers than that required for cooling towers.
- Dry cooling can have noise impacts that are greater than once-through or wet cooling systems because of the number of fans and the considerably greater total airflow rate. New quieter fans and other mitigation measures are available to reduce these impacts.
- Using dry cooling, the power plant steam cycle efficiency and output can be slightly reduced, depending on site conditions and seasonal variations in ambient conditions. Also, extra power is needed to operate the cooling fans.
- Capital costs for building air-cooled condensers are generally higher than capital costs for once-through cooling.

Description of the Air Cooled Condensers

In order to compare the performance and impacts of a dry cooling system or ACC with that of the wet-cooled system, the operating conditions at a common design point must be established. The design and operation of an ACC are highly dependent upon the ambient conditions at a specific site.

Size, Configuration, and Layout

The size of an ACC is a function of the heat load from the steam turbine generator and the ambient conditions. The ACC is composed of tube bundles with fins attached to the tubes to enhance heat transfer to the air. These bundles are grouped together and mounted in an A-frame configuration on a steel support structure. These A-frame tube bundles are aligned in rows or bays. Steam is ducted directly from the steam turbine exhaust to the ACC where it enters in a parallel flow into the tubes across the top of the bays. Air is blown from below across the finned tube bundles by a series of large fans, which are located beneath the A-frame tube bundles. Each fan is considered a module. To accommodate the large mass of air required for cooling the steam, the A-frame tube bundles are elevated on top of an open structure. As the steam passes down through the tube bundles, it is condensed and drains by gravity flow into a tank from which it is pumped back to the steam turbine. Since the steam is exhausted directly from the steam turbine generator after it has expanded through the turbine, it is at both a very low pressure and large volume. This condition limits the distance that the ACC can be located from the steam turbine generator, due to the drop in pressure that results during the transport of the steam; this limitation must be taken into consideration when configuring the plant layout.

Staff has not developed and analyzed detailed layouts for the ACC system. However, it is assumed that the ACC system would be located where the cooling towers are currently proposed. **Alternatives Figure 2** illustrates the approximate size and location of the ACC on the power block layout.

Approximately 18 ACC fans would be required for cooling each 125 MW power block when the ambient temperature is above 50 degrees Fahrenheit (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). The proposed wet cooling towers and associated equipment occupy an area of about 420 feet long by 60 feet wide. While the ACCs would require about 40 to 50 percent more land area than the proposed wet cooling towers, from the site layout, it appears that such a system would fit in the approximate current location of the cooling tower as there is unused space between the power block and the solar collector assembly (GSEP 2009a). This unused space would have been previously graded as it is designed to be used for construction parking and construction trailers. An environmental assessment of the impacts of using dry-cooling instead of wet-cooling is presented in each individual technical discussion for each resource element in this Revised Staff Assessment.

NO PROJECT/NO ACTION ALTERNATIVE

CEQA No Project Alternative

The No Project Alternative under CEQA defines the scenario that would exist if the proposed Genesis Solar Energy Project were not constructed. The CEQA Guidelines

state that “the purpose of describing and analyzing a ‘no project’ alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project” (Cal. Code Regs., tit. 14 § 15126.6(i)).

The No Project analysis considers existing conditions and “what would be reasonably expected to occur in the foreseeable future if the project were not approved.” (Cal. Code Regs, tit. 14 § 15126.6, subd. (e)(2)).

If the No Project Alternative were selected, the construction and operational impacts of the Genesis Solar Energy Project would not occur. There would be no grading of the site, no loss of resources or disturbance of desert habitat, and no installation of power generation and transmission equipment. The No Project Alternative would also eliminate contributions to cumulative impacts on a number of resources and environmental parameters in Riverside County and in the Sonoran Desert as a whole. **Project Description 3** provides a depiction of proposed solar energy application developments provided by BLM’s Palm Springs – South Coast Filed Office.

In the absence of the Genesis Solar Energy Project, however, other power plants, both renewable and non-renewable, may have to be constructed to serve the demand for electricity and to meet the California Renewable Portfolio Standard (RPS). The impacts of these other facilities may be similar to those of the proposed project because these technologies require large amounts of land like that required for the Genesis Solar Energy Project. The No Project/No Action Alternative may also lead to siting of other non-solar renewable technologies to help achieve the California RPS.

Additionally, if the No Project/No Action Alternative were chosen, additional gas-fired power plants may be built, or existing, older and inefficient gas-fired plants, many of which rely on Once-Through Cooling (OTC), may operate longer. Importantly, if the proposed Genesis project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide, and California utilities would not receive the 250 MW contribution to their renewable state-mandated energy portfolio.

PROJECT OBJECTIVES

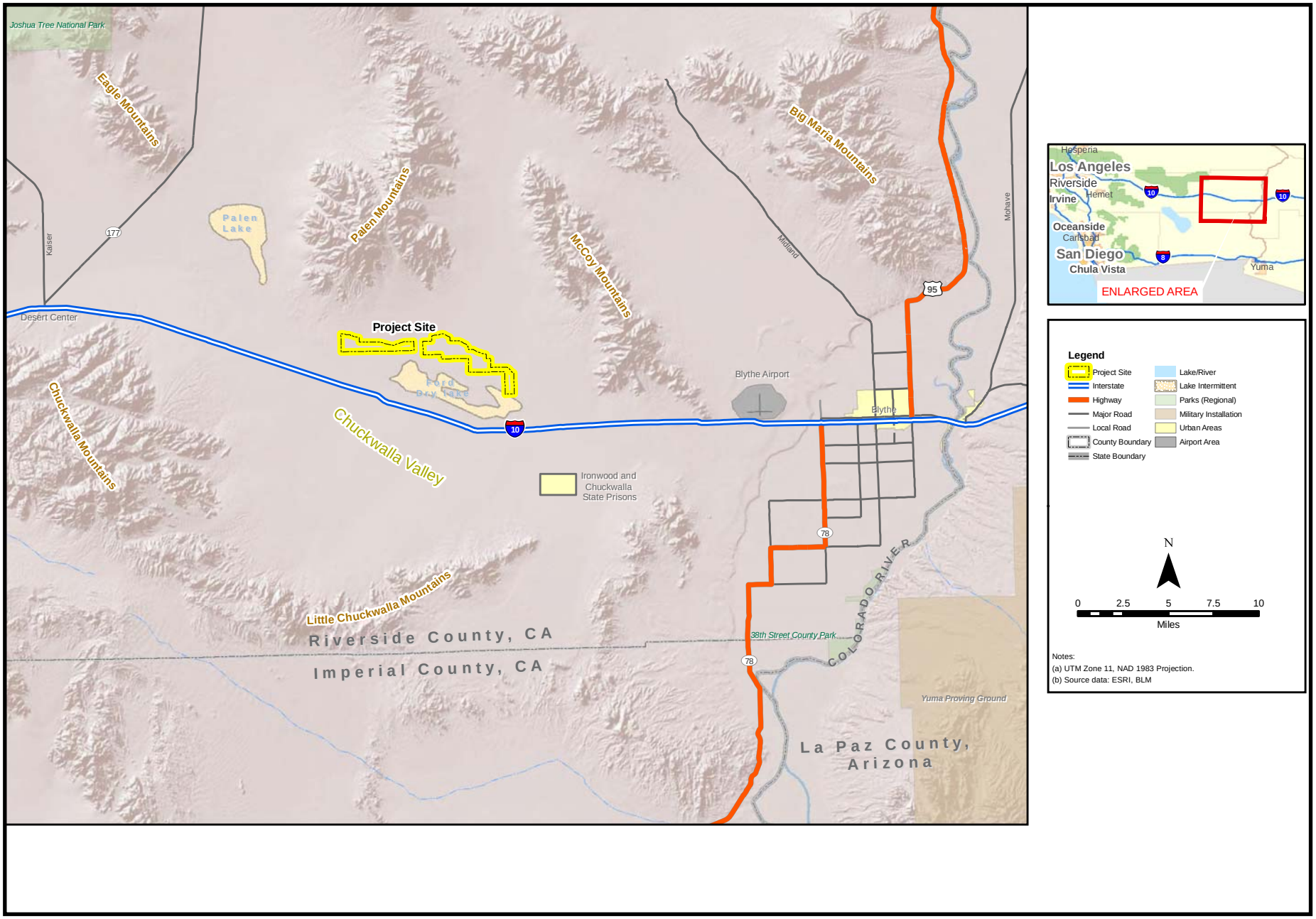
The Genesis Solar Energy Project objectives are as follows:

- To construct, operate and maintain an efficient, economic, reliable, safe and environmentally sound solar powered generating facility throughout its useful life to help: (i) achieve the State of California objectives mandated by SB 1078 (California Renewable Portfolio Standard Program), (ii) AB 32 (California Global Warming Solutions Act of 2006), and (iii) other local mandates adopted by the State’s municipal electric utilities to meet the requirements for the long-term, wholesale purchase of renewable electric energy for distribution to their customers;
- To develop a site with an excellent solar resource;
- To develop a site with close proximity to transmission infrastructure in order to minimize associated environmental impacts;
- To develop a new utility-scale solar energy project using proven concentrated solar trough technology; and,

- To develop a site with available degraded ground water resources to allow wet cooling in order to maximize power generation, optimize efficiency, and reduce the delivered cost of electricity to customers.

PROJECT DESCRIPTION - FIGURE 1

Genesis Solar Energy Project - Projection Location

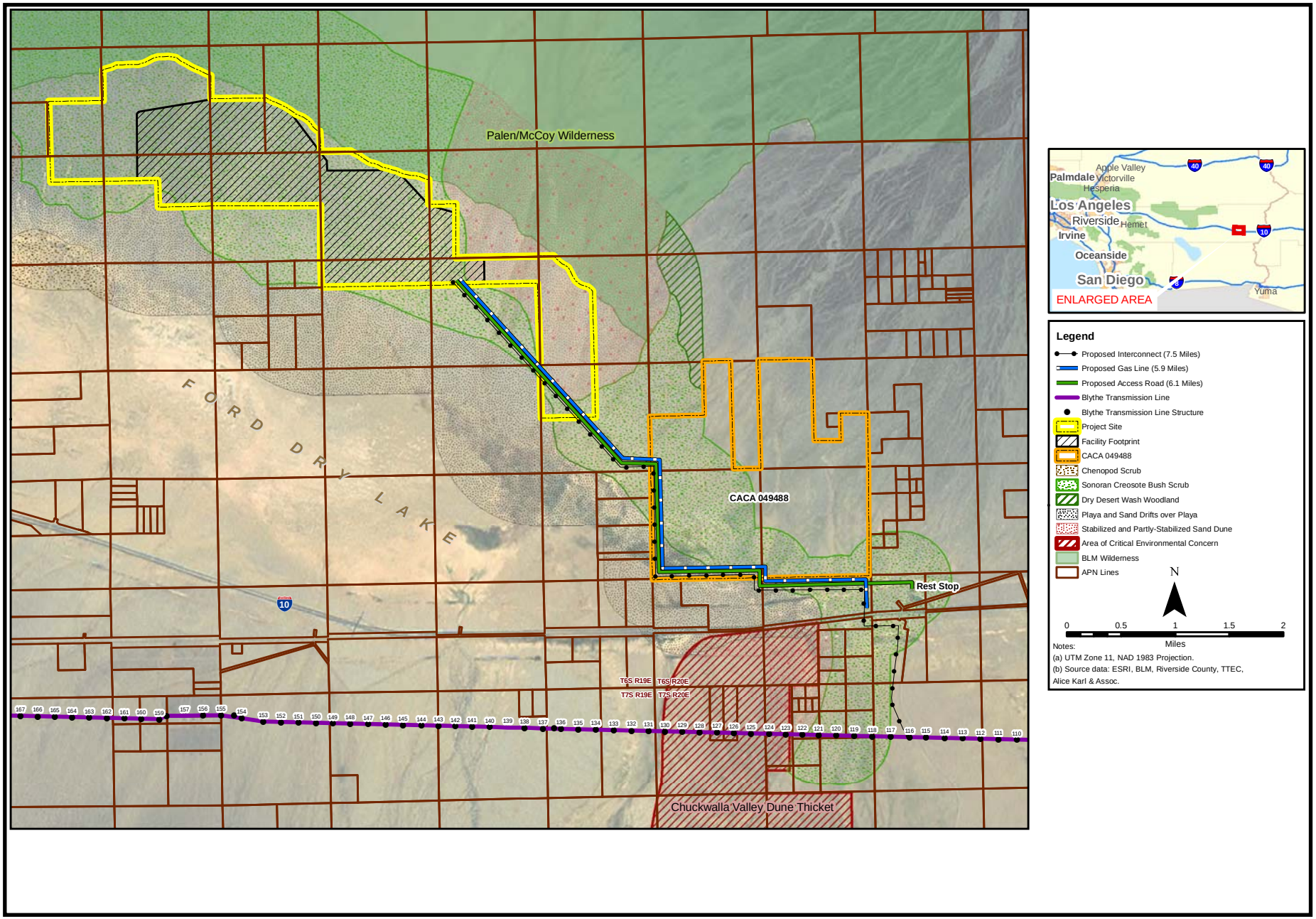


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: AFC 3.2-1

PROJECT DESCRIPTION - FIGURE 2

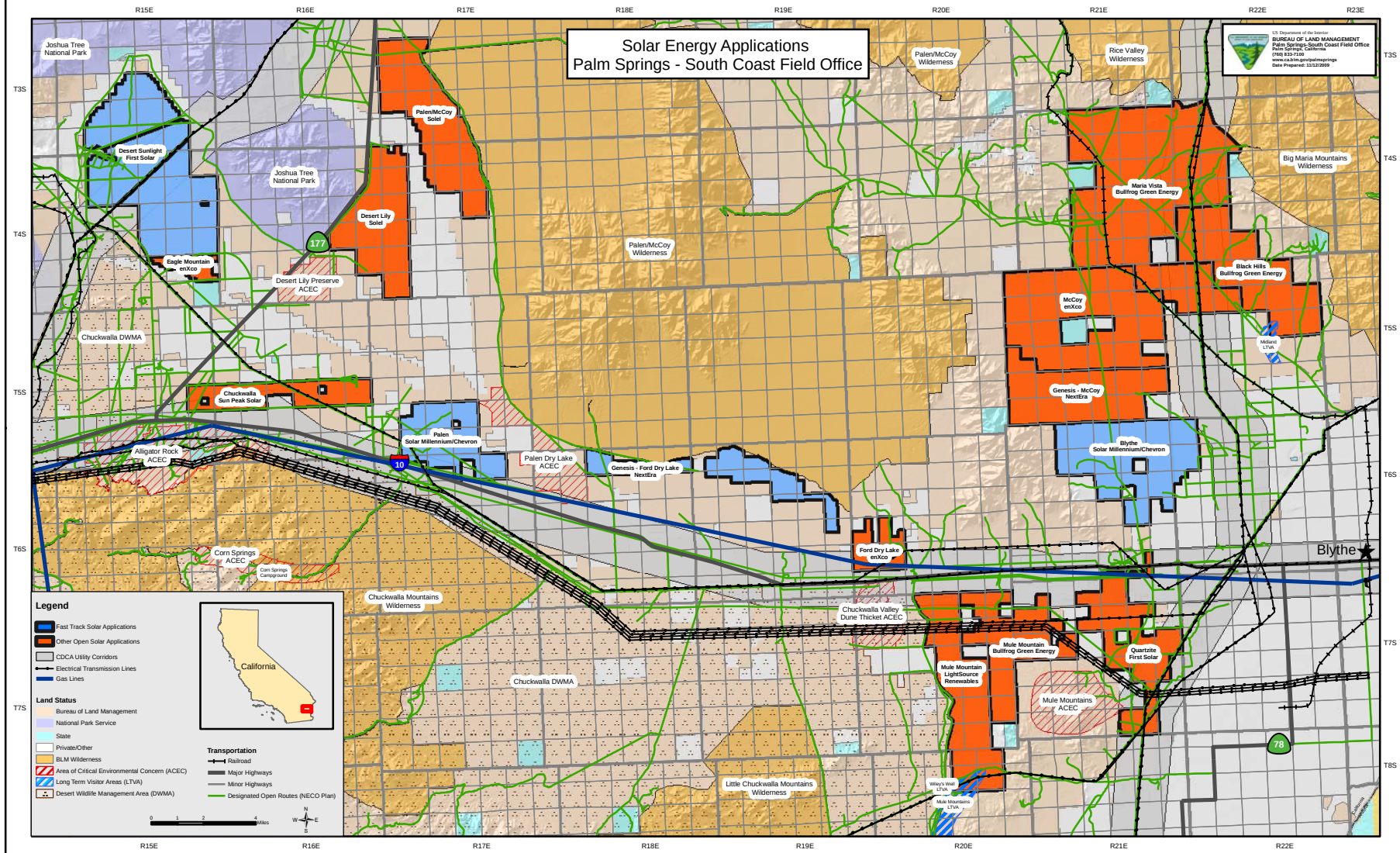
Genesis Solar Energy Project - Facility Footprint and Linear Corridor Revision - December 2009



SOURCE: AFC

PROJECT DESCRIPTION - FIGURE 3

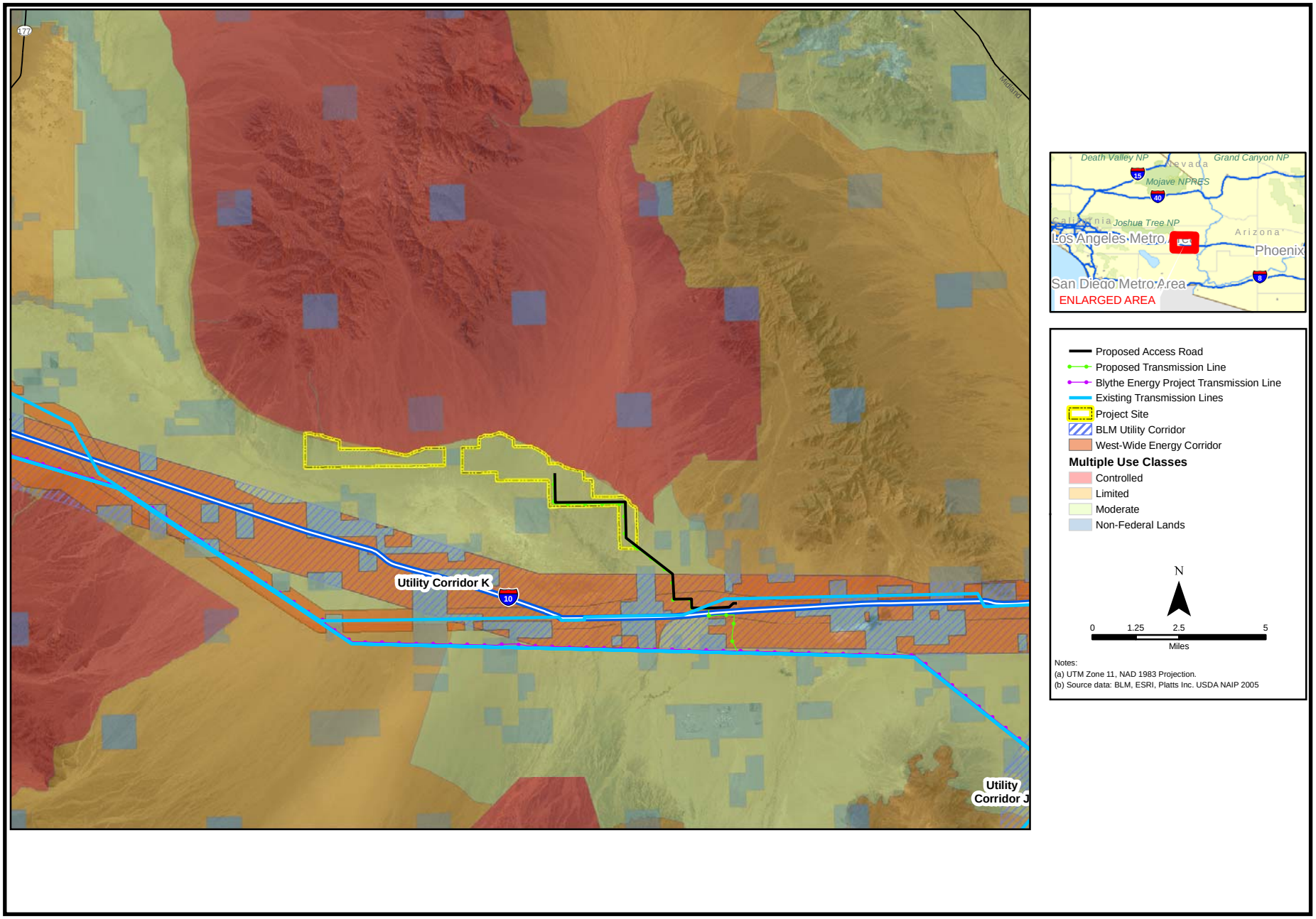
Genesis Solar Energy Project - Solar Energy Applications, Palm Springs - South Coast Office



SOURCE: AFC

PROJECT DESCRIPTION - FIGURE 4

Genesis Solar Energy Project - BLM Multiple Use Classifications Energy Corridors & Transmission Lines



SOURCE: AFC Figure 5.7-1

B.2 – ALTERNATIVES EVALUATED

Testimony of Susan V. Lee

B.2.1 SUMMARY OF CONCLUSIONS

In this analysis of the Genesis Solar Energy Project, 25 alternatives to the project have been identified and evaluated. These include six alternative site locations or configurations, a dry cooling alternative, a range of different solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management. Of the 25 alternatives, three alternatives were determined to be reasonable and potentially feasible by the Energy Commission and have the potential to reduce impacts that would be created by the proposed project: the Reduced Acreage Alternative, the Gabrych Alternative, and the Dry Cooling Alternative. In addition to the proposed action, the No Project Alternative was considered.

The Dry Cooling Alternative is analyzed in each discipline's analysis in Section C and was found to have impacts similar to the proposed project for most resource elements. However, because it would use less water, it would reduce impacts to groundwater-dependent ecosystems, reduce induced outflow from the Colorado River, and reduce impacts of the visible vapor plumes that the proposed project would create with use of cooling towers. However, staff found that these impacts are either insignificant (in the case of thermal plumes) or capable of being reduced to a level that is not significant through mitigation (in the case of groundwater-dependent ecosystems and the Colorado River). In addition, the Dry Cooling Alternative would bring the proposed project into conformity with State water policy. The Dry Cooling Alternative was found to reduce the efficiency of the steam power cycles, which would slightly reduce the total amount of power generated. As a result, the benefits of the GSEP in replacing gas-fired power plants and associated greenhouse gases would be slightly reduced. The Dry Cooling Alternative is considered to be a potentially feasible alternative to the GSEP's use of wet-cooling and is preferred to the proposed project.

The Reduced Acreage Alternative is considered to be potentially feasible, as solar thermal facilities of 125 MW and smaller are currently proposed in California. The Reduced Acreage Alternative is analyzed in each discipline's analysis in Section C and would be half as large as the proposed project and would reduce the impacts of the proposed GSEP by approximately 50 percent. It would affect substantially less Mojave fringe-toed lizard habitat, substantially reduce the geomorphic impacts, and create no impacts to the Chuckwalla and Palen-McCoy sand corridors. Like the 250 MW proposed project, the Reduced Acreage Alternative would not bring the proposed project into conformity with State water policy because use of wet cooling fails to minimize water use. However, as highlighted in the Section C.1 (Air Quality), the Reduced Acreage Alternative would reduce the benefits of the proposed GSEP by approximately 50 percent. While the alternative would reduce the impacts of the proposed project by roughly 50 percent, it would also reduce the project benefits the same amount, and still would not be found in conformity with the State water policy. The Reduced Acreage Alternative would not eliminate or avoid any significant environmental impacts of the proposed project.

The No Project Alternative is not superior to the proposed project because it would likely delay development of renewable resources or shift renewable development to other similar areas, and could lead to increased operation of existing power plants that use non-renewable technologies.

The Gabrych Alternative, which was presented by the applicant, would have impacts similar to those of the proposed site in many resource elements. However, it is likely to have less severe biological resources and cultural resources impacts, as it is located on disturbed lands used for agriculture. The Gabrych Alternative would be located on some active and some previously farmed agriculture land, resulting in a significant impact to agriculture.

Alternative solar thermal technologies (Stirling engine, solar power tower, utility scale solar photovoltaics, and linear Fresnel) are also evaluated. As compared with the proposed solar trough technology, most of these technologies would not substantially change the severity of visual impacts, biological resources impacts and cultural impacts, as all require extensive acreage. Distributed solar photovoltaic facilities would likewise require extensive acreage if deployed in the same location as the project, although it can also be installed on existing buildings, minimizing the loss of undisturbed open space. However, increased deployment of distributed solar photovoltaics faces challenges in manufacturing capacity, cost, and policy implementation. Water use varies among the technologies, although the solar trough technology used by the proposed project represents the highest level of water use of these alternatives.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) are also examined as possible alternatives to the project. These technologies would either be infeasible at the scale of the Genesis Solar Energy Project, or would not reduce or eliminate significant impacts caused by the Genesis Solar Energy Project without creating their own significant impacts in other locations. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that would be served by the Genesis Solar Energy Project. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements. Wave and tidal technologies are not yet commercially available in the United States.

Staff's analysis of renewable energy technology options indicates that contributions from each commercially available renewable technology will be needed to meet California's Renewable Portfolio Standard requirements and to achieve the statewide renewable energy target for 2020. Therefore, the combined contribution of the alternatives of wind, distributed solar photovoltaic, geothermal, and biomass is needed to complement rather than substitute for the Genesis Solar Energy Project solar thermal contribution to meeting statewide renewable energy requirements. The table below indicates that each of these four alternative technology options when considered individually is insufficient to meet the project objectives related to the Renewable Portfolio Standard.

Alternatives Table 1 lists the alternatives retained for analysis in this RSA and those eliminated, and summarizes the rationale for each conclusion.

Alternatives Table 1. Summary of Alternatives Retained and Eliminated

Alternative	Rationale for Retention or Elimination
Alternatives Retained for CEQA and NEPA Analysis	
Proposed Project/Action - 250 MW	Evaluated as the applicant's proposal.
Reduced Acreage Alternative - 125 MW	Evaluated in the RSA because it would substantially reduce impacts of the Genesis Solar Energy Project and meet the BLM purpose and need.
Dry Cooling Alternative	Evaluated in the RSA because it would substantially reduce impacts of the Genesis Solar Energy Project and meet the BLM purpose and need.
No Project/No Action Alternative	Required under CEQA and NEPA. Note that additional NEPA No Action Alternatives are described below under Land Use Plan Amendment Alternatives.
Land Use Plan Amendment Alternatives Evaluated Only under NEPA	
Authorize Genesis Solar Energy Project through a CDCA Land Use Plan Amendment	Action required under the CDCA Plan of 1980, as amended.
Amend CDCA Land Use Plan for a reduced size project or project including dry cooling within the proposed project's boundaries (125 MW)	A smaller project or a project including dry cooling reduces impacts; site location is an action for which an amendment to the CDCA Plan of 1980, as amended, is required.
Do not approve the ROW grant and do not amend the CDCA Land Use Plan of 1980, as amended.	The first No Action Alternative: deny the ROW application and do not amend the CDCA Land Use Plan of 1980.
Do not approve the ROW grant and amend the CDCA Land Use Plan of 1980, as amended, to make the area unavailable for future solar development.	The second No Action Alternative: deny the ROW application and amend the CDCA Land Use Plan of 1980 to make the site unavailable for any future solar development.
Do not approve the ROW grant and amend the CDCA Land Use Plan of 1980 to make the area available for future solar development.	The third No Action Alternative: deny the ROW application but amend the CDCA Land Use Plan of 1980 to make the site available for future solar development.
Site Alternative Evaluated Under CEQA	
Gabrych Alternative	Would substantially reduce impacts of the Genesis Solar Energy Project while meeting most project objectives.

Alternative	Rationale for Retention or Elimination
Alternatives Eliminated from Detailed Analysis	
McCoy	Would not substantially reduce impacts of the Genesis Solar Energy Project; pending right-of-way grant application for the site, therefore not considered a viable alternative.
Desert Center 1	Desert Center 1 region was in an area that would potentially be subsumed in expansions of the Joshua Tree National Park and/or the McCoy Wilderness. In the fall of 2008, the BLM rejected the application for ROW grant for the use of the region.
Mule Mountain	Would not substantially reduce impacts of the Genesis Solar Energy Project; pending right-of-way grant application for the site, therefore not considered a viable alternative.
Black Hill	Would not substantially reduce impacts of the Genesis Solar Energy Project; pending right-of-way grant application for the site, therefore not considered a viable alternative.
Private Land Alternative	Portions of the private lands were analyzed as the Blythe Mesa Alternative in the Blythe Solar Power Project SA/EIS.
Western ROW Alternative	Would not substantially reduce impacts of the Genesis Solar Energy Project
Reclaimed Water Alternative	Sufficient reclaimed water is not available; would not substantially reduce impacts to the water accounting system for the groundwater basin
Stirling Dish Technology	Would reduce water use but would not substantially reduce impacts of the Genesis Solar Energy Project.
Solar Power Tower Technology	Would reduce water use but would not substantially reduce impacts of the Genesis Solar Energy Project.
Linear Fresnel Technology	Would reduce area required by about 40% and water use, but would not eliminate significant impacts of the Genesis Solar Energy Project.
Solar Photovoltaic Technology – Utility Scale	Would reduce water use but requires similar land area so would not substantially reduce impacts of the Genesis Solar Energy Project.

Alternative	Rationale for Retention or Elimination
Distributed Solar Technology	While it will very likely be possible to achieve 250 MW of distributed solar energy over the coming years, the limited numbers of existing facilities make it difficult to conclude with confidence that this much distributed solar will be available within the timeframe required for the Genesis Solar Energy Project. Barriers exist related to interconnection with the electric distribution grid. Also, solar PV is one of the components of the renewable energy mix required to meet the California Renewable Portfolio Standard requirements, and additional technologies like solar thermal generation, would also be required.
Wind Energy	While there are substantial wind resources in Riverside County, environmental impacts could also be significant so wind would not reduce impacts in comparison to the Genesis Solar Energy Project. Also, wind is one of the components of the renewable energy mix required to meet the California Renewable Portfolio Standard requirements, so additional technologies like solar thermal generation, would also be required.
Geothermal Energy	Despite the encouragement provided by Renewable Portfolio Standards and ARRA funding, few new geothermal projects have been proposed in the Imperial Valley and no geothermal projects are included on the Renewable Energy Action Team list of projects requesting ARRA funds. Therefore, the development of 250 MW of new geothermal generation capacity within the timeframe required for the Genesis Solar Energy Project appears to be unlikely.
Biomass Energy	Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet the project objectives related to the California Renewable Portfolio Standard. In addition, between 25 and 80 facilities would be needed to achieve 250 MW of generation, creating substantial adverse impacts.
Tidal Energy	Tidal fence technology is commercially available in Europe. However, it has not been demonstrated and proven at the scale that would be required to replace the proposed project, particularly with Pacific tides. It may also result in substantial adverse environmental impacts
Wave Energy	Unproven technology at the scale that would be required to replace the proposed project; it may also result in substantial adverse environmental impacts
Natural Gas	Would not attain the objective of generating renewable power meeting California's renewable energy needs

Alternative	Rationale for Retention or Elimination
Coal	Would not attain the objective of generating renewable power meeting California's renewable energy needs and is not a feasible alternative in California
Nuclear Energy	The permitting of new nuclear facilities in California is not currently allowable by law
Conservation and Demand-side Management	Conservation and demand-management alone are not sufficient to address all of California's energy needs, and would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements

B.2.2 INTRODUCTION

Genesis Solar, LLC (a subsidiary of NextEra) proposes to build the Genesis Solar Energy Project (GSEP) on BLM-administered land, which is federal land under the administrative jurisdiction of the BLM. Since the BLM is a federal agency, the GSEP is subject to review under the National Environmental Policy Act (NEPA) in addition to the California Environmental Quality Act (CEQA). The purpose of this alternatives analysis is to comply with State and Federal environmental laws by providing a reasonable range of alternatives which, under CEQA, could substantially reduce or avoid any potentially significant adverse impacts of the proposed project, or under NEPA, would inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. This section summarizes the potentially significant impacts of the proposed project and analyzes different technologies and alternative sites that may reduce or avoid significant impacts.

Of the 25 alternatives, two alternatives were determined to be both reasonable for the BLM and feasible for the Energy Commission: the Reduced Acreage Alternative and the Dry Cooling Alternative. These alternatives and the no project/no action alternative are analyzed in further detail within each of the technical sections of this document, and are considered for selection as the preferred alternative.

This section presents analysis of one site alternative that is evaluated under CEQA only and presents the plan amendment alternatives evaluated under NEPA only. The section also presents the discussion and analysis of all alternatives eliminated from detailed consideration by both the Energy Commission and the BLM.

B.2.3 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

NextEra proposes to build the GSEP facility on federal land administered by the BLM. Since the BLM is a federal agency and the California Energy Commission has State authority to approve thermal power plants, the GSEP is subject to review under both NEPA and CEQA.

California Environmental Quality Act Criteria

The *Guidelines for Implementation of the California Environmental Quality Act*, Title 14, California Code of Regulations, section 15126.6(a), provides direction by requiring an evaluation of the comparative merits of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." In addition, the analysis must address the "no project" alternative (Cal. Code Regs., tit. 14, § 15126.6(e)).

The range of alternatives is governed by the "rule of reason" which requires consideration only of those alternatives necessary to permit informed decision making and public participation. CEQA states that an environmental document does not have to consider an alternative the effect of which cannot be reasonably ascertained and of which the implementation is remote and speculative (Cal. Code Regs., tit. 14, § 15125(d)(5)).

National Environmental Policy Act Criteria

NEPA requires that the decision-makers and the public be fully informed of the impacts associated with the proposed project. NEPA declares that the Federal government's continuing policy is to create and maintain conditions under which people and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of Americans.

Regulations promulgated by the Council on Environmental Quality (CEQ) require that an EIS rigorously explore and objectively evaluate a reasonable range of alternatives to a proposed action. Reasonable alternatives are those for which effects can be reasonably ascertained, whose implementation is not remote or speculative, that are feasible, effective, are not remote from reality, and those that are consistent with the basic policy objectives for management of the area. (40 CFR 1502.14; CEQ Forty Questions, No. 1A; Headwaters , Inc. v. BLM, 914 F.2d. 1174 (9th Cir. 1990)). Reasonable alternatives are dictated by the nature and scope of the proposed action. To determine reasonable alternatives, an agency must define the purpose and need of the proposal. The purpose and need of the proposed action is to be evaluated under a reasonableness standard.

Further, "[i]n determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative." (CEQ Forty Questions, No. 2a.)

Consideration of a No Action alternative is mandated by NEPA. As with the CEQA No Project alternative, this is the scenario that would exist if the proposed project were not constructed and no land use plan amendment was approved.

U.S. ARMY CORPS OF ENGINEERS REGULATIONS

The U.S. Army Corps of Engineers has not yet issued a determination regarding whether ephemeral drainages on the proposed GSEP site are jurisdictional waters of the U.S. Federal regulations require that if waters of the U.S. are affected by a proposed project, alternatives must be considered that reduce effects on the waters of the U.S. These regulations are presented in CFR 40 Part 230 Section 404(b)(1) Guidelines for

Specification of Disposal Sites for Dredged or Fill Material, Subpart B--Compliance With the Guidelines, Sec. 230.10 Restrictions on discharge. Those regulations require that the Corps prepare a “404(b)1 Analysis” to evaluate alternatives.

Regarding the Corps’ required alternatives analysis, the regulations state the following:

> (a) Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.
>
> (1) For the purpose of this requirement, practicable alternatives include, but are not limited to:
>
> > (i) Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;
> >
> > (ii) Discharges of dredged or fill material at other locations in waters of the United States or ocean waters;
>
> (2) An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant, which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.
>
> (3) Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in subpart E) does not require access or proximity to or sighting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise.

To meet these requirements, this alternatives analysis fully considers two alternatives within the boundaries of the proposed project, as described in Section B.2.6. In addition, a range of other alternatives that comply with the Corps’ guidelines are presented in Section B.2.8 (alternatives considered but eliminated from detailed analysis), and an offsite alternative is evaluated in Section B.2.7 (Site Alternatives Evaluated Under CEQA).

B.2.4 SCREENING METHODOLOGY

To prepare the alternatives analysis, the following methodology was used:

1. Develop an understanding of the project, identify the basic objectives of the project, and describe its potentially significant adverse impacts.

2. Under CEQA, identify and evaluate technology alternatives to the project such as increased energy efficiency (or demand-side management) and the use of alternative generation technologies (e.g., solar or other renewable or nonrenewable technologies).

3. Under CEQA, identify and evaluate alternative locations.

4. Under CEQA, evaluate potential alternatives to select those qualified for detailed evaluation.

5. Under NEPA, explore and evaluate a reasonable range of alternatives, and of those reasonable alternatives, identify those that would avoid or minimize adverse impacts or enhance the quality of the human environment.

6. Evaluate the impacts of not constructing the project, known as the No Project Alternative under CEQA and the No Action Alternative under NEPA.

Based on this methodology, each potential alternative was evaluated according the following criteria for its ability to:

- for CEQA purposes avoid or substantially lessen one or more of the potential significant effects of the project as described above;
- for CEQA purposes meet most project objectives;
- for NEPA purposes be consistent with the purpose and need to which BLM is responding.

B.2.4.1 APPLICANT'S PROJECT OBJECTIVES

The following objectives and purpose are set forth by NextEra (GSEP 2009a):

- To construct, operate, and maintain an efficient, economic, reliable, safe, and environmentally sound solar powered generating facility throughout its useful life to help: (i) achieve the State of California objectives mandated by SB 1078 (California Renewable Portfolio Standard Program); (ii) AB 32 (California Global Warming Solutions Act of 2006); and (iii) other local mandates adopted by the State's municipal electric utilities to meet the requirements for the long-term wholesale purchase of renewable electric energy for distribution to their customers.
- To develop a site with an excellent solar resource.
- To develop a site with close proximity to transmission infrastructure in order to minimize environmental impacts.
- To develop a new utility-scale solar energy project using proven concentrated solar trough technology.
- To develop a site with available water resources to allow wet cooling in order to optimize power generation efficiency and reduce project cost.

Additionally, NextEra states that the project would:

- Address local mandates that California's electric utilities have adopted for the provision of renewable energy.
- Assist the California Independent System Operator (CAISO) in meeting its strategic goals for the integration of renewable resources.
- Contribute to reductions in greenhouse gas emissions.

B.2.4.2 PROJECT OBJECTIVES OF THE ENERGY COMMISSION (CEQA)

After considering the objectives set out by the applicant, the Energy Commission has identified the following basic project objectives, which are used to evaluate the viability of alternatives in accordance with CEQA requirements:

- To construct a utility-scale solar energy project of up to 250 MW and interconnect directly to the CAISO Grid while minimizing additions to electrical infrastructure; and
- To locate the facility in areas of high solar insolation.

In addition, when considering retention or elimination of alternative renewable technologies, in addition to evaluating the likelihood of reducing or eliminating the potential impacts of Genesis Solar Energy Project at its proposed site, staff evaluated whether alternative technologies could meet the following key project objectives:

- To provide clean, renewable electricity to support California's Renewable Portfolio Standard Program (RPS);
- To assist in reducing greenhouse gas emissions as required by the California Global Warming Solutions Act;
- To contribute to the achievement of the 33 percent renewables RPS target set by California's governor and legislature; and
- To complete the review process in a timeframe that would allow the applicant to start construction or meet the economic performance guidelines by December 31, 2010 to potentially qualify for the 2009 ARRA cash grant in lieu of tax credits for certain renewable energy projects.

B.2.4.3 BLM PURPOSE AND NEED FOR PROPOSED PROJECT AND PLAN AMENDMENT

Bureau of Land Management. The Energy Policy Act of 2005 (EPAct) encourages the United States Department of the Interior (DOI), BLM's parent agency, to approve at least 10,000 MW of renewable energy on public lands by 2015. Executive Order 13212, dated May 18, 2001, mandates that agencies expedite their "review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections" in the "production and transmission of energy in a safe and environmentally sound manner."

Secretarial Order 3283, *Enhancing Renewable Energy Development on the Public Lands*, requires the BLM to ensure that processing and permitting of renewable energy projects comply with the requirements of the National Environmental Policy Act, Endangered Species Act, National Historic Preservation Act, and all other laws and regulations; improve efficiencies in the processing of renewable energy applications and the consistent application of renewable energy policies; and develop Best Management Practices for renewable energy projects on public lands to ensure the most environmentally responsible development of renewable energy, among other goals.

Secretarial Order 3285, *Renewable Energy Development by the Department of the Interior*, requires BLM to encourage the development of environmentally responsible

renewable energy generation. Both of these Secretarial Orders will be considered in responding to the NextEra application for the proposed GSEP.

NextEra has filed an application with BLM for a right-of-way (ROW) grant pursuant to the Federal Land Policy and Management Act (FLPMA, 43 USC 1761). Under FLPMA Title V Section 501 (a)(4) (Rights-of-Way), the United States Secretary of the Interior, as delegated to the BLM, is authorized to grant ROW on lands administered by the BLM for the purpose of allowing systems for generation, transmission, and distribution of electric energy.

The **BLM's Purpose and Need** for the GSEP is to respond to the NextEra application under Title V of FLMPA for a ROW grant to construct, operate and decommission a solar thermal facility and associated infrastructure in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws. The BLM will decide whether to approve, approve with modification, or deny issuance of a ROW grant to NextEra for the proposed GSEP. A land use plan amendment to the California Desert Conservation Area (CDCA) Plan of 1980 would be required before BLM could issue the ROW grant. The decision the BLM will make is whether or not to grant a ROW and, if so, under what terms and conditions, and whether or not to amend the land use plan.

BLM Plan Amendment. As discussed in Section A, solar power facilities are an allowable use of lands designated as Multiple Use Class (MUC) L (limited use) areas (CDCA). Since the site for the proposed GSEP is currently classified within an MUC L area, solar power facilities are generally allowed. However, Chapter 3, the “Energy Production and Utility Corridors Element” of the CDCA Plan requires that newly proposed sites associated with power generation or transmission facilities not already identified in the Plan will be considered through the plan amendment process. The proposed GSEP site is not currently identified in the proposed power facility and transmission line element within the Plan. As such, a plan amendment is required in order to approve the site location consistent with the CDCA Plan. The plan would have to be amended prior to the approval of the proposed project. The result of the plan amendment may be that the Multiple Use Class would change from MUC L (limited use) to MUC I.

Department of Energy. NextEra has also applied to the United States (US) Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the EPAct. Title XVII of EPAct authorizes the United States Secretary of Energy to make loan guarantees for a variety of types of projects, including those that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued.” The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for action by DOE is to comply with their mandate under EPAct by selecting eligible projects that meet the goals of the Act.

American Recovery and Reinvestment Funds. NextEra has also applied for American Recovery and Reinvestment Funds (ARRA) Renewable Energy Grant Program. Two goals of the ARRA Renewable Energy Grant Program are to enhance

America's energy independence and create near-term employment opportunities for Americans. To be eligible for the ARRA funds, NextEra must begin construction on the GSEP by the end of 2010.

B.2.4.4 IMPACTS OF THE PROPOSED PROJECT

Based on the analysis presented in the technical sections of this Revised Staff Assessment (RSA), the following impacts, discussed in full in Sections C and D, have been identified as issues of greatest concern for the GSEP:

- Cultural Resources: The proposed GSEP would have a significant direct impact on 14 historically significant archaeological resources and a potential significant indirect impact on 1 ethnographic resource. Although the BLM plans to address cultural resources through a Programmatic Agreement (PA) negotiated amongst all federal, state, and private stakeholders, the RSA includes Conditions of Certification that would mitigate project impacts to cultural resources to a level that is not significant. Development of the PA by the BLM is underway, but will not be completed until mid-summer.
- Biological Resource: The GSEP would have significant impacts to biological resources, eliminating all of the Sonoran creosote bush scrub and other native plant and wildlife communities within the approximately 1,880-acre site. The GSEP would result in loss of an extensive network of desert washes comprising approximately 83 acres of state jurisdictional waters, and would significantly alter the hydrology of the area by re-routing ephemeral drainages through engineered channels. The GSEP would impact 1,786 acres of desert tortoise habitat, including 23 acres within the Chuckwalla Desert Critical Habitat Unit. The proposed groundwater pumping would have an impact on groundwater levels in the Chuckwalla Valley Groundwater Basin with potential adverse effects to groundwater-dependent sensitive plant communities and to wildlife. Project impacts in conjunction with the effects of development of the Chuckwalla Valley will contribute cumulatively to the overall loss of dune habitat, desert washes, and the fragmentation and degradation of the remaining habitat for Mojave fringe-toed lizard and several dune-dependent rare plant species. Proposed renewable energy development in Chuckwalla Valley could threaten what remains of the habitat and places several populations at risk, most notably, the local Chuckwalla population of the Mojave fringe-toed lizard.
- Soil and Water Resources: The proposed project would pump groundwater from the Chuckwalla Valley Groundwater Basin (CVGB) and have an impact on levels of groundwater in the Chuckwalla Valley Groundwater Basin (CVGB). However, the magnitude of potential impacts cannot be determined precisely. In addition, preliminary analysis suggests that groundwater withdrawn from production wells draw from the Palo Verde Mesa groundwater basin, a tributary to the Colorado River and as a result, the proposed GSEP pumping may induce flows from the Colorado River. The proposed Project would be located on an alluvial fan where flash flooding and mass erosion could impact the Project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users. Cumulative impacts: analysis indicates that groundwater extraction during construction and operation of this and other reasonably foreseeable projects would place the basin into an overdraft condition. This impact may be exacerbated by other renewable energy projects in the I-10 corridor, which has been targeted as a potential area for further

renewable energy development. However, the amount of water that is storage in the basin greatly exceeds the amount of cumulative overdraft, rendering the project's contribution to this cumulative impacts less than cumulatively considerable.

- Visual Resources: The anticipated cumulative operational visual impacts of the GSEP in the Chuckwalla Valley are considered potentially significant from some sensitive viewpoints, particularly within the Chuckwalla Wilderness. Anticipated cumulative operational visual impacts of region-wide projects in the southern California desert are considered cumulatively considerable and potentially significant.
- Land Use: Approximately one million acres of land are proposed for solar and wind energy development in southern California desert lands. Cumulative impacts to approximately one million acres of land would all combine to result in adverse effects on agricultural lands and recreational resources. The cumulative conversion of these lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, result in a significant and unavoidable cumulative land use impact.

The alternatives analysis focuses on the consideration of these impacts and the extent to which they could be reduced or eliminated with use of alternative sites or technologies.

B.2.5 SUMMARY OF SCOPING AND SCREENING RESULTS

The public scoping comment period allowed the public and regulatory agencies an opportunity to comment on the scope of the environmental document and the alternatives considered, and to identify issues that should be addressed in the environmental review. The discussion below presents the key issues identified from the written and oral comments received on the GSEP. The specific issues raised during the public scoping process that relate to Alternatives are summarized as follows:

- Eliminate the western portion of the Genesis project near Palen Dry Lake ACEC (western portion of the Genesis project has not been included in the proposed GSEP design);
- Consider a dry cooling alternative (See Section B.2.6.2);
- Project should be pulled back from dunes and other sensitive areas onsite, or preferably moved to an alternative site closer to existing disturbance and transmission (See Section B.2.7.2);
- Alternatives should include consideration of disturbed, private lands near the GSEP (Sufficient disturbed, private lands for a 250 MW solar power plant were not available near the GSEP, an alternative on disturbed, private lands elsewhere was considered. See Section B.2.7.2);
- Alternatives should not be tied to a specific Power Purchase Agreement that the applicant may have entered into (See Section B.2.6.1);
- Alternatives should consider using disturbed private lands, including land that is outside of BLM jurisdiction, and distributed generation (See Section B.2.7.2 and Section B.2.8.2);

- The AFC filed by NextEra fails to include a reasonable range of alternatives including the No Action Alternative and the reasonably foreseeable alternative of locating solar photovoltaic (PV) distributed generation (DG) near to load centers on brown-field sites (roof tops) where new transmission infrastructure may not be needed to connect these solar resources (See Section B.2.6.3 and Section B.2.8.2);
- Alternatives should be placed near existing transmission lines (The I-10 corridor is a designated utility corridor with existing and planned transmission lines);
- Private sites should not be rejected simply because they have numerous owners – there is no indication the level of effort the applicant put into acquiring private lands (See Section B.2.7.2);
- Agencies should compare the GSEP and its impacts with all other identified "fast-track" projects on BLM land in order to identify the least environmentally harmful projects among the applications that have been selected for expedited permitting;
- According the Energy Commission, only 128,000 acres maximum (both private and public) are needed to achieve the RPS goal so there is ample opportunity to consider species migration needs and patterns, established wildlife corridors and climate change implications on proposed project lands; and

Scoping comments are also listed in the **Summary of Comments** in the **Introduction** section of this RSA.

B.2.6 ALTERNATIVES EVALUATED UNDER NEPA AND CEQA

A number of scoping comments requested that the project be reconfigured or reduced in size to avoid sensitive resources and to consider technologies that would reduce impacts to water use. Scoping comments suggested including the disturbed lands in the vicinity of the project in the project footprint to make up for any loss in acreage. The scoping comments are addressed in the alternatives described herein and in the site alternative evaluated in Section B.2.7. This section describes three alternatives to the proposed project: the Reduced Acreage Alternative, the Dry Cooling Alternative, and the "No Project/No Action" Alternative. The alternatives are evaluated under both NEPA and CEQA in Section C (Environmental Analysis).

In addition, scoping comments identified the need for more comprehensive Land Use Plan Amendments that could further address minimizing the cumulative effects of large scale renewable projects along the I-10 Corridor. Proposed Land Use Plan Amendments are depicted in Appendix B and include consideration of those areas both inside and outside the project footprint that could be managed specifically for right away avoidance or exclusion areas, habitat conductivity and targeted acquisition areas that would function for compensatory mitigation for sensitive species.

Section B.2.7.2 presents a detailed analysis of the impacts of constructing and operating the proposed project at the Gabrych Alternative site (retained for analysis under CEQA). The impacts of the Reduced Acreage Alternative and the Dry Cooling Alternative are analyzed in detail in Section C of the RSA. The analysis is presented in Section C because these alternatives were also retained for consideration under NEPA in the SA/DEIS. Although the RSA and Final EIS are not being published as a joint

document, the impact analysis of the Reduced Acreage Alternative and Dry Cooling Alternative remains in Section C so that the RSA retains a substantially similar format to the Staff Assessment.

B.2.6.1 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 (or one-half) of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts would be reduced, and (2) it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**. As with the proposed GSEP, a land use plan amendment to the California Desert Conservation Area (CDCA) Plan of 1980 would be required before BLM could issue the ROW grant for the Reduced Acreage Alternative.

The Reduced Acreage Alternative would have a net generating capacity of approximately 125 MW and would occupy approximately 900 acres of land. This alternative would retain 50 percent of the proposed project's generating capacity, and would affect 50 percent of the land affected by the proposed project. Specifically, the alternative would retain the Unit 1 solar field, including the construction parking, construction trailers, and temporary construction laydown area; the administration building and warehouse; the solar collector assembly area; the western evaporation pond area (approximately 24 acres); and the land farm area (approximately 10 acres). The alternative would require relocating the switchyard, from the Unit 2 power block to the Unit 1 power block. The eastern evaporation pond area (approximately 24 acres) that corresponds with Unit 2 would not be included in the Reduced Acreage Alternative. This area could be used for the relocated gas yard if needed.

Similar to the proposed project, the Reduced Acreage Alternative would transmit power to the grid through the Colorado River Substation. It would require infrastructure including groundwater wells, a transmission line, road access, an administration building, and evaporation ponds. The required infrastructure and transmission line for the Reduced Acreage Alternative would follow the routes defined for the proposed project, even though Unit 2 would not be constructed. The linear facilities would require approximately 90 acres. The gas pipeline would be approximately 1 mile longer than for the proposed project.

Dry cooling is being evaluated as an alternative to the proposed project, so could also be used with this 125 MW configuration. However, if wet cooling were used, cooling would require approximately 822 acre-feet of water per year.

According to the applicant, independent studies have indicated a 250 MW size project is an optimal size where economies of scale and the potential for excess parasitic losses balance out. However, no evidence has been provided to demonstrate this, and solar thermal facilities as small as 20 MW are currently proposed in California. A detailed cost-benefit analysis for a reduced-size project would be required in order to determine the economic feasibility of this alternative.

The applicant also states that there is no substantial environmental advantage to a smaller size project (GSEP 2009a). Environmental impacts of the Reduced Acreage Alternative are presented in Section C.

B.2.6.2 DRY COOLING ALTERNATIVE

Description of the Process and Equipment Required

There are two types of dry cooling systems: direct dry cooling and the lesser used indirect dry cooling. In both systems, fans blow air over a radiator system to remove heat from the system via convective heat transfer (instead of once-through cooling or evaporative heat transfer). In the direct dry cooling system, also known as an air-cooled condenser (ACC), steam from the steam turbine exhausts directly to a manifold radiator system that rejects heat to the atmosphere, condensing the steam inside the radiator. Direct dry cooling is analyzed as the alternative to the wet cooling proposed by NextEra for the GSEP.

Dry cooling is the best choice of cooling technologies for a steam power plant to conserve water and minimize wastewater. However, this technology can create both environmental and economic concerns, depending on the location and specific situation. These concerns are evaluated for the GSEP site in detail in Sections C and D of this RSA.

Advantages and Disadvantages of Dry Cooling

The following is a summary of the advantages and disadvantages of dry cooling for the GSEP.

Advantages of Dry Cooling Systems

- Dry cooling allows a power plant location to be less dependent on a water source. It would allow the use of less water and would reduce operation use of water from 822 AFY to approximately 66 AFY per 125 MW power block in a water-constrained environment (GSEP 2009f).
- Dry cooling minimizes the use of water treatment chemicals.
- Dry cooling minimizes the generation of liquid and solid wastes.
- Dry cooling does not generate visible plumes that are commonly associated with wet cooling towers and visual impacts of the dry cooling alternative were found to be less than significant.
- Impacts to groundwater-dependent biological resources, expected to be substantial under the proposed project would not be substantial using dry cooling technology.
- Dry cooling minimized the need for disturbance of wetland/aquatic substrate habitat.
- Dry Cooling is consistent with the State’s water policy.

Disadvantages of Dry Cooling Systems

- Dry cooling requires air-cooled condensers that can have negative visual effects, but the location of the GSEP is too remote for the air-cooled condensers to be visible.

- Compared to once-through cooling, dry cooling requires the disturbance of a larger area for the air-cooled condensers than that required for cooling towers. However, at the project site the air-cooled condensers would be located entirely within the previously disturbed project footprint so would not require any additional ground disturbance.
- Dry cooling can have noise impacts that are greater than once-through or wet cooling systems because of the number of fans and the considerably greater total airflow rate. However, because of the distance between the air-cooled condensers and any sensitive receptors, for the GSEP, this impact was found to be less than significant for dry cooling.
- Using dry cooling, the power plant steam cycle efficiency and output can be slightly reduced, depending on site conditions and seasonal variations in ambient conditions. Also, extra power is needed to operate the cooling fans.
- Capital costs for building air-cooled condensers are generally higher than capital costs for once-through cooling; however, in this case, the evaluated installed cost difference between wet and dry cooling was less than 1 percent (GSEP 2009f).

Description of the Air Cooled Condensers

In order to compare the performance and impacts of a dry cooling system or ACC with that of the wet-cooled system, the operating conditions at a common design point must be established. The design and operation of an ACC are highly dependent upon the ambient conditions at a specific site.

Size, Configuration, and Layout

The size of an ACC is a function of the heat load from the steam turbine generator and the ambient conditions. The ACC is composed of tube bundles with fins attached to the tubes to enhance heat transfer to the air. These bundles are grouped together and mounted in an A-frame configuration on a steel support structure. These A-frame tube bundles are aligned in rows or bays. Steam is ducted directly from the steam turbine exhaust to the ACC where it enters in a parallel flow into the tubes across the top of the bays. Air is blown from below across the finned tube bundles by a series of large fans, which are located beneath the A-frame tube bundles. Each fan is considered a module. To accommodate the large mass of air required for cooling the steam, the A-frame tube bundles are elevated on top of an open structure. As the steam passes down through the tube bundles, it is condensed and drains by gravity flow into a tank from which it is pumped back to the steam turbine. Since the steam is exhausted directly from the steam turbine generator after it has expanded through the turbine, it is at both a very low pressure and large volume. This condition limits the distance that the ACC can be located from the steam turbine generator, due to the drop in pressure that results during the transport of the steam; this limitation must be taken into consideration when configuring the plant layout.

Staff has not developed and analyzed detailed layouts for the ACC system. However, it is assumed that the ACC system would be located where the cooling towers are currently proposed. **Alternatives Figure 2** illustrates the approximate size and location of the ACC on the power block layout.

Approximately 18 ACC fans would be required for cooling each 125 MW power block when the ambient temperature is above 50 degrees Fahrenheit (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). The proposed wet cooling towers and associated equipment occupy an area of about 420 feet long by 60 feet wide. While the ACCs would require about 40 to 50 percent more land area than the proposed wet cooling towers, from the site layout, it appears that such a system would fit in the approximate current location of the cooling tower as there is unused space between the power block and the solar collector assembly (GSEP 2009a). This unused space would have been previously graded as it is designed to be used for construction parking and construction trailers. An environmental assessment of the impacts of using dry-cooling instead of wet-cooling is presented in Sections C and D, for each resource element.

Economic Feasibility

As stated above, a NextEra project objective was to use a site that would allow wet cooling in order to optimize power generation efficiency and reduce project cost. Wet-cooling maximizes power plant fuel efficiency by providing a continuous source of effective cooling for the plant's steam condensers. Dry cooling will typically provide less effective cooling of the condensers, reducing the efficiency of the steam cycle portion of the power plant, and thus the overall fuel efficiency of the facility. The FSA for the Beacon Solar Energy Project (08-AFC-2; BSEP 2009) showed that annual average fuel efficiency would be reduced 5-7 percent compared to a wet cooling system. The applicant stated that use of dry cooling would result in a 7.4 percent decrease in total annual net MWh compared with a wet cooling system which NextEra considerers significant, since peak demand for the Project would be during the summer when ACC performance is limited (GSEP 2009a). NextEra concludes that the use of dry cooling will decrease the project output, which will render the Project economically unsound or noncompetitive (GSEP 2009a).

The Genesis Solar Energy Project Cooling Study states that because of the brackish water being proposed for the site requires treatment prior to use, the evaluated installed cost difference between wet and dry cooling was less than 1 percent (GSEP 2009f). As such, it is not the installation cost difference between wet and dry cooling that would render dry cooling economically unsound or noncompetitive but the decrease in total annual new MWh. Additionally, the cooling study estimates a decrease of annual net MWh when using dry cooling of 6.9 percent, as opposed to the 7.4 percent mentioned in the AFC by the applicant (GSEP 2009f).

When considering a dry cooling alternative in the Beacon Solar Energy Project FSA, the applicant proposed expanding the solar field by 12 percent to counter the reduction in generation that would result from dry cooling (BSEP 2009). The GSEP applicant also addresses an expanded solar field and states that the proposed project has been

optimized for the land available, and a solar field expansion would be infeasible at this site (GSEP 2009a). However, the power block and solar arrays would occupy approximately 1,360 acres of the 1,800-acre site. Evaporation ponds, access roads, administration buildings, and other support facilities would require a portion of the 1,800-acre site, and there is also remaining open space (GSEP 2009a). A 12 percent increase in the GSEP solar field would require an additional 150 acres. While it is uncertain whether the entire 150 acres is available for use and would comply with the engineering requirements for GSEP, it is clear from the site plan that there is some available land immediately adjacent to existing solar trough rows and this land could be used to offset all or a portion of the efficiency loss due to the use of dry-cooling.

The FSA for the Beacon Solar Energy Project contained a detailed cost analysis for that project using dry cooling (BSEP 2009). In the FSA, staff found that the Beacon Solar Energy Project was economically feasible using dry cooling because it surpassed the benchmark internal rate of return established for economic feasibility. Furthermore, the Beacon Solar Energy Project was found to be economically feasible using dry cooling both with and without an expanded solar field (BSEP 2009). While not all circumstances of the Beacon Solar Energy Project and the GSEP are identical, the applicant has not provided persuasive evidence that the additional cost or lost profitability from incorporating dry cooling into the GSEP is sufficiently severe as to render dry cooling impracticable.

The applicant's arguments of impracticability are further undercut by the fact that all but two of the solar thermal project currently being considered by the Energy Commission were designed using dry cooling (air cooled condensers). This includes the three solar thermal projects in the same general area (climate) as the GSEP, which would have similar if not identical efficiency losses from using dry cooling. Because of this, staff concludes that dry cooling is economically feasible and is therefore evaluated under both NEPA and CEQA in Section C (Environmental Analysis). The analysis contained in Section C demonstrates that the use of dry cooling will not create any significant adverse environmental impacts and will reduce impacts associated with water use as well as eliminate the proposed project's non-conformity with State water policy.

B.2.6.3 NO PROJECT/NO ACTION ALTERNATIVE

CEQA No Project Alternative

The No Project Alternative under CEQA defines the scenario that would exist if the proposed GSEP were not constructed. The CEQA Guidelines state that "the purpose of describing and analyzing a 'no project' alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project" (Cal. Code Regs., tit. 14 § 15126.6(i)). The No Project analysis in this RSA considers existing conditions and "what would be reasonably expected to occur in the foreseeable future if the project were not approved." (Cal. Code Regs, tit. 14 § 15126.6(e)(2)).

If the No Project Alternative were selected, the construction and operational impacts of the GSEP would not occur. There would be no grading of the site, no loss of resources or disturbance of desert habitat, and no installation of power generation and transmission equipment. The No Project Alternative would also eliminate contributions

to cumulative impacts on a number of resources and environmental parameters in Riverside County and in the Mojave Desert as a whole.

In the absence of the GSEP, however, other power plants, both renewable and non-renewable, may have to be constructed to serve the demand for electricity and to meet the RPS. The impacts of these other facilities may be similar to those of the proposed project because these technologies require large amounts of land like that required for the GSEP. The No Project/No Action Alternative may also lead to siting of other non-solar renewable technologies to help achieve the California RPS.

Additionally, if the No Project/No Action Alternative were chosen, additional gas-fired power plants may be built, or that existing gas-fired plants may operate longer. If the proposed project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide, and California utilities would not receive the 250 MW contribution to its renewable state-mandated energy portfolio.

NEPA No Action Alternatives

Under NEPA, the No Action Alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives. Like the No Project Alternative described above, under the No Action Alternative, the impacts of the Genesis Solar Energy Project would not occur.

BLM is considering two separate actions (whether to approve a plan amendment and whether to approve the proposed project or an alternative). BLM's "action alternative" would be to amend the CDCA Plan to include GSEP (250 MW), and to approve the project as proposed. The GSEP and ancillary facilities are approved, a ROW grant is issued, and the CDCA Plan is amended to include the GSEP generation facilities and transmission line as an approved site under the Plan. Similarly, BLM could amend CDCA Plan to include one of the alternatives fully analyzed in this Draft EIS (the Dry Cooling Alternative or Reduced Acreage Alternative), and approve the construction and operation of those alternatives. The alternative and ancillary facilities would be approved, a ROW grant for the appropriate acreage would be issued, and the CDCA Plan would be amended to include the alternative power generation facilities and transmission line as an approved site under the Plan.

BLM's alternatives related to the No Action Alternative and the Plan amendment are the following:

- **No Action on Genesis Solar Energy Project application and on CDCA land use plan amendment**. The Genesis Solar Energy Project is not approved (denied), no ROW grant is issued, and no CDCA Plan amendment is approved. There is no consideration of information that would allow approval of a CDCA Plan amendment that would make the land available for large scale energy development in the future.
- **No Action on Genesis Solar Energy Project application and amend the CDCA land use plan to make the area available for future solar development.** The Genesis Solar Energy Project is not approved (project denied), and no ROW grant is issued to SES, but the CDCA plan is amended to make the project area available for large scale renewable energy development under a future project .

- **No Action on Genesis Solar Energy Project and amend the CDCA land use plan to make the area unavailable for future solar development.** The Genesis Solar Energy Project is not approved (project denied), and no ROW grant is issued to Genesis, LLC and the CDCA plan is amended to make the project area unavailable for large scale renewable energy development.

Each of these No Action Alternatives is addressed under each resource element of Sections C and D of this RSA.

B.2.7 CEQA-ONLY ALTERNATIVE RETAINED

One site alternative is evaluated by the Energy Commission under CEQA only. The Gabrych Alternative is located on private land. The Energy Commission does not have the authority to approve an alternative or require NextEra to move the proposed project to another location, even if it identifies an alternative site that meets the project objectives and avoids or substantially lessens one or more of the significant effects of the project. Implementation of an alternative site would require that the applicant submit a new Application for Certification (AFC), including revised engineering and environmental analysis. This more rigorous AFC-level analysis of any of the alternative sites could reveal environmental impacts; nonconformity with laws, ordinances, regulations, and standards; or potential mitigation requirements that were not identified during the more general alternatives analysis presented herein. Preparation and review of a new AFC would require substantial additional time.

No specific alternative site for the GSEP was suggested in scoping comments; however, a number of commenters requested that alternatives on disturbed private lands be considered.

B.2.7.1 SITE SELECTION CRITERIA FOR THE RETAINED CEQA ALTERNATIVE

The following site selection criteria identified in the GSEP AFC were used to choose the proposed site (GSEP 2009a):

- The site must receive insolation of no less than 7.0 kilowatt-hours per square meter per day (kWh/m^2/day).
- The site must be large enough (at least 1,800 contiguous acres) to support a 250-MW plant and arranged in a way that allows an efficient and cost-effective layout.
- The site needs to be relatively flat, with a slope of three percent or less.
- To be economically viable, the site should be located on property currently available at a reasonable cost, have reasonable proximity to infrastructure, and have good solar resources. Sites with excellent solar resources may be able to carry somewhat higher mitigation costs or infrastructure costs.
- The site needs to be located so it can be interconnected with an existing transmission system without the need for new, long dedicated transmission lines, while also providing good access to water for power plant cooling. The site also needs reasonable access to a natural gas pipeline.

- The land for the power plant site and linear facilities has to be available for purchase or lease.

A number of scoping comments included the criteria list for areas to avoid in siting renewable projects defined by Audubon California and other groups:

- Locations that support sensitive biological resources, including: federally designated and proposed critical habitat; significant populations of federal or state threatened and endangered species, significant populations of sensitive, rare and special status species, and rare or unique plant communities;
- Areas of Critical Environmental Concern, Wildlife Habitat Management Areas, proposed HCP and NCCP Conservation Reserves;
- Lands purchased for conservation including those conveyed to the BLM;
- Landscape-level biological linkage areas required for the continued functioning of biological and ecological processes;
- Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas;
- Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands;
- National Historic Register eligible sites and other known cultural resources;
- Locations directly adjacent to National or State Park units.

It is noted also that during the FLPMA ROW grant pre-application period, BLM worked closely with the project applicant to identify a feasible site without known environmental concerns. This effort resulted in identification of the proposed site, and in fact reflected many of the suggested criteria for siting identified by Audubon California. Similarly, the alternative site considered in this RSA was selected to meet as many of these criteria as possible.

Other Sites on BLM Land

The BLM has received a large number of utility-scale solar energy project proposals for BLM-administered lands in California. The BLM processes solar energy right-of-way applications under its Solar Energy Development Policy (Instructional Memorandum No. 2007-097) and addresses environmental concerns for the utility-scale energy projects on a case-by-case basis in conformance with its existing policies, manuals, and statutory and regulatory authorities. Under its existing regulations, BLM determines if competing applications exist for the same facility or system. Applications that are first in time are given priority in consideration and are not considered competing applications with those filed later in time.

In addition, a site with an active pending application is not considered to be a reasonable alternative to a proposed project, such as GSEP. This is because selection and approval of a site with an active pending application in lieu of the proposed project cannot be assured, given the precedence of the first application. If BLM were to consider the site with an active pending application as an alternative to the proposed project, it would inherently be making a determination of reasonableness of the

proposed alternative. However, an active pending application is given priority in consideration for that site location. Unless and until the active pending application is eliminated from consideration, BLM would not approve the site with the active pending application over the proposed project. Therefore, an alternative site on BLM land with an active pending application for another project is not considered a reasonable alternative to the proposed project for purposes of alternatives analysis.

The BLM and Department of Energy (DOE) are preparing a Programmatic Environmental Impact Statement (PEIS) on solar energy development in six states in the western U.S. (Arizona, California, Colorado, New Mexico, Nevada, and Utah) (USDOE 2008). As part of the PEIS, the BLM and DOE identified 24 tracts of BLM-administered land for in-depth study for solar development, some or all of which may be found appropriate for designation as solar energy zones in the future. The public scoping period on the solar energy zone maps ended in September 2009. The Draft PEIS should be published in 2010; the appropriateness of siting solar energy plants on various land use designations may be revisited in the PEIS.

California Governor Executive Order S-14-08 requires the Renewable Energy Action Team to establish a Desert Renewable Energy Conservation Plan (DRECP) for the Mojave and Colorado Desert regions. The Planning Agreement regarding the DRECP was entered into by the Energy Commission, California Department of Fish and Game, BLM, and U.S. Fish and Wildlife Service and is charged with identifying areas suitable for renewable energy project development and areas that will contribute to the conservation of sensitive species and natural communities. A draft report is currently being drafted.

Design of the Proposed Project

The proposed project (Genesis Solar Energy Project) is a nominal 250 MW solar plant located on approximately 1,800 acres. The project is divided into two independent concentrated solar electric generating facilities, where the two power blocks and solar fields would each be located on approximately 680 acres and would create 125 MW of solar energy. Additional acreage would be required for evaporation ponds, access roads, administration buildings, other support facilities, and land treatment units (NextEra 2009a). This layout defines the area required for an alternative site.

B.2.7.2 GABRYCH ALTERNATIVE

The proposed GSEP is described above. Scoping comments requested that an alternative site on disturbed land be considered, thereby lessening the potential impacts to the desert environment. Commenters also noted that disturbed agriculture lands occur in the vicinity of the project and should be considered as possible alternatives.

The applicant stated that three private land sites were considered in the Blythe area (GSEP 2009f). The applicant did not pursue any of these alternatives because of concerns that any water use in the Blythe area would impact the Colorado River water basin (GSEP 2009f). Of the three alternatives considered by the applicant, the Gabrych site is considered here because (a) it seemed to have the best potential to reduce impacts to biological and cultural resources and (b) it was not already considered as an alternative to a different solar project.

The Gabrych Alternative site is located along Neighbors Boulevard just south of the Riverside/Imperial County line, and approximately 12 miles south of I-10. It is located on ten parcels of private land making up 1,800 acres of land and would avoid the Harvey's Fishing Hole community, adjacent to the Colorado River. The Gabrych Alternative is shown in **Alternative Figure 3**.

The Gabrych Alternative would be within the Colorado Desert with appropriate slope and solarity requirements. The elevation of the site is between 200 and 250 feet above sea level. The site would be accessed via Neighbors Boulevard off the I-10. A small rural community, Harvey's Fishing Hole, would be located just south of the solar field but would be avoided by the project. A small sand/gravel mining operation occurs just west of the residential area and would also be avoided by the solar project. The Gabrych Alternative is defined as a project that would incorporate dry cooling, reducing the amount of water needed for the project to 66 AFY (GSEP 2009f).

The Gabrych Alternative sites would be made up of approximately 10 unique parcels with one land owner. The Final Phase 2a Report published by the Renewable Energy Transmission Initiative (RETI) and updated in September 2009 identified private land areas for solar development only if there were no more than 20 owners in a two square mile (1,280 acre) area. Additionally, the Gabrych Alternative site was identified by the Final Phase 2a Report as disturbed land that would support renewable energy development. However, the Gabrych parcels currently support agricultural operations.

Transmission Interconnection. The nearest designated transmission ROW is located approximately 5 miles west of the Gabrych Alternative site. The transmission interconnection would head west five miles, crossing agricultural lands, to reach a BLM CDD designated utility corridor. At this point, the transmission interconnection would turn north for approximately ten miles until reaching the proposed Colorado Substation. The transmission interconnection would be adjacent to a WAPA 161 kV line for most of the route.

Environmental and Engineering Assessment of the Gabrych Alternative

Air Quality

Environmental Setting. The Gabrych Alternative would be located in the Salton Sea Air Basin (SSAB) under the jurisdiction of the Imperial County Air Pollution Control District (ICAPCD). The Imperial County portion of the SSAB is designated as non-attainment for the federal and state ozone standards, the federal PM10 standard, and the state PM10 standard. This area is designated as attainment or unclassified for the state and federal CO, NOx, SOx, and PM2.5 standards. The entire SSAB is classified as attainment for the federal standard and unclassified for the state standards. This divergence in PM10 and PM2.5 attainment status indicates that a substantial fraction of the ambient particulate matter levels are most likely due to localized fugitive dust sources, such as vehicle travel on unpaved roads, agricultural operations, or wind-blown dust. The Gabrych Alternative is surrounded primarily by agricultural operations.

Environmental Impacts. Exhaust emissions from heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) would be

essentially the same at any site. Exhaust emissions would also be caused by workers commuting to and from the work sites, from trucks hauling equipment and supplies to the sites, and crew trucks (e.g., derrick trucks, bucket trucks, pickups). Workers and trucks hauling equipment and supplies would have to commute approximately 12 miles north (from Blythe) to reach the Gabrych Alternative. The proposed project is located approximately 20 miles west of Blythe. Appropriate mitigation at the Gabrych Alternative site would likely involve similar, locally oriented recommendations such as the conditions of certification presented in the **Air Quality** section of this RSA. However, as the Gabrych Alternative is located in Imperial County, it would be required to comply with the existing District rules and regulations and the applicable Imperial County air quality plans.

As with the proposed GSEP, the Gabrych Alternative would emit some GHG emissions. However, the contribution of the project if built at the Gabrych Alternative to the system build-out of renewable resources to meet the goals of the Renewable Portfolio Standard (RPS) in California would result in a net cumulative reduction of energy generation and GHG emissions from new and existing fossil-fired electricity resources. Electricity is produced by operation of inter-connected generation resources. Operation of one power plant, like GSEP, affects all other power plants in the interconnected system. The operation of the GSEP at the Gabrych Alternative site would affect the overall electricity system operation and GHG emissions in several ways:

- Gabrych Alternative would provide low-GHG, renewable generation.
- Gabrych Alternative would facilitate to some degree the replacement of high GHG emitting (e.g., out-of-state coal) electricity generation that must be phased out to meet the State's 2006 Emissions Performance Standard.
- Gabrych Alternative could facilitate to some extent the replacement of generation provided by aging fossil-fired power plants that use once-through cooling.

These system impacts would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, as with the proposed GSEP, the Gabrych Alternative would result in a cumulative overall reduction in GHG emissions from power plants, does not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant.

Comparison to Proposed Project. The construction and operational emissions at the Gabrych Alternative site would be similar to those of the GSEP at the proposed site.

Biological Resources

Environmental Setting. The Gabrych Alternative site is located in the Colorado Desert bioregion, encompassing all of Imperial County, the southeastern portion of Riverside County, the eastern end of San Bernardino County, and the eastern portion of San Diego County. This agriculturally rich bioregion is semi-arid and heavily irrigated (California Environmental Resources Evaluation System [CERES] 2010). The Gabrych Alternative is located in the Palo Verde Valley, east of the Palo Verde Mesa and the City of Palo Verde, immediately north and west of the Colorado River.

The Colorado Desert is the western extension of the Sonoran desert, which covers southern Arizona and northwestern Mexico. Much of the Colorado Desert lies below 1,000 feet in elevation. Mountain peaks rarely exceed 3,000 feet. Common habitats include sandy desert, scrub, palm oasis, and desert wash. Summers are hot and dry, and winters are cool and moist (CERES 2010).

The Colorado Desert supports a diverse array of plant and animal species including the Yuma antelope ground squirrel (*Ammospermophilus harrisii*), white-winged dove (*Zenaida asiatica*), muskrat (*Ondatra zibethicus*), southern mule deer (*Odocoileus hemionus fuliginata*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and raccoon (*Procyon lotor*). Rare animals include desert pupfish (*Cyprinodon macularius*), flat-tailed horned lizard (*Phrynosoma mcallii*), Andrew's dune scarab beetle (*Pseudocotalpa andrewsi*), Coachella Valley fringe-toed lizard (*Uma inornata*), Le Conte's thrasher (*Toxostoma lecontei*), and California leaf-nosed bat (*Macrotus californicus*). Rare plants include Orcutt's woody aster (*Xylorhiza orcuttii*), Orocopia sage (*Salvia greatae*), foxtail cactus (*Coryphantha alversonii*), Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*), and crown of thorns (*Euphorbia* sp.; CERES 2010).

A reconnaissance field survey of the Gabrych Alternative was conducted in January 2010. Because the Gabrych Alternative is located on private land, the survey was limited to public access points. While detailed vegetation mapping was not conducted for the Gabrych Alternative site, vegetation polygons were sketched based on what could be seen from public access points in the field as well as aerial photograph interpretation. These polygons were then digitized using a Geographic Information System (GIS), thereby providing a rough estimate of the total acreage for each vegetation community on the Gabrych Alternative site. This mapping and the acreages derived from it are extremely preliminary (reconnaissance level) and should be used only to provide a generalized understanding of the amount and types of vegetation present. A full vegetation mapping effort would be required to provide more accurate maps and figures.

The Gabrych Alternative site consists mainly of active agricultural fields and active sheep grazing. Neighbors Boulevard traverses the central portion of the site from north to south, and several unnamed dirt roads cross the site between agricultural fields. Five named irrigation canals cross the site: C Canal, D-23-1 Canal, D-23-1-3 Canal, D-23-1-4 Canal, and D-23-1-5 Canal. Several residences occur in a concentrated area at the southern end of Neighbors Boulevard, adjacent to the river. These residences and the surrounding areas would be avoided by the alternative. A small sand/gravel mining operation occurs just west of the residential area.

Approximately 160 acres of the site support native vegetation communities; these parcels occur primarily in the southwest corner of the site. Surrounding lands include the Colorado River to the east and south, and active agriculture to the west and north. Cibola National Wildlife Refuge is located approximately three miles south of the site, in Arizona. Topography on site is relatively flat, with elevation ranging from approximately 235 to 245 feet above mean sea level (AMSL). There are nine soil series mapped for this alternative: Cibola, Gilman, Glenbar, Holtville, Imperial, Indio, Meloland, Ripley, and Rositas, much of which prime farmland (Soil Survey Staff 2009).

A small stand of riparian scrub occurring along the D-23-1-3 Canal in the northeast portion of the site, as well as more extensive riparian habitat occurring along the C Canal in the southwestern portion of the site and along the Colorado River in the southern portion of the site would potentially be considered waters of the state under the jurisdiction of the CDFG and may be considered waters of the U.S. under the jurisdiction of the ACOE. As with the residences in the southern portion of the site, the riparian habitat would be avoided by the alternative layout. Areas of arrowweed scrub occurring in the southwestern corner of the site also would be considered waters of the state under the jurisdiction of the CDFG and may be considered waters of the U.S. under the jurisdiction of the ACOE. The named on-site canals may be considered connected to the Colorado River and as such are potentially jurisdictional to the ACOE and CDFG. A jurisdictional delineation and coordination with the ACOE and CDFG would be necessary to formally determine the jurisdictional areas on site.

Wildlife Use. Undeveloped portions of the site (the southwest corner) are used by a variety of common animal species such as coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus bachmani*), raccoon (*Procyon lotor*), and various resident and migratory bird species such as American kestrel (*Falco sparverius*), Gambel's quail (*Callipepla gambelii*), white-crowned sparrow (*Zonotrichia leucophrys*), sage sparrow (*Amphispiza belli*), Say's phoebe (*Sayornis saya*), and black phoebe (*Sayornis nigricans*), as well as the desert kangaroo rat (*Dipodomys deserti*). Agricultural areas on site support foraging habitat for red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), turkey vulture (*Cathartes aura*), American kestrel, and phoebes. The canals carrying water support potential foraging habitat for species such as the belted kingfisher (*Ceryle alcyon*) and white-faced ibis (*Plegadis chihi*).

Although the site itself does not function as a movement corridor for wildlife, the adjacent Colorado River and contiguous undeveloped lands (where present) do provide corridor functions for several species.

Vegetation Communities. Active agriculture, riparian scrub, arrowweed scrub, desert saltbush scrub (including disturbed), disturbed habitat, and developed land are the six primary vegetation communities on the alternative site. The acreages presented below are rough estimates, as detailed vegetation mapping was not conducted.

Active and fallow agriculture (including crops and sheep grazing) occurs on approximately 1,817 acres (approximately 85 percent) of this alternative site. The edges of the fields consist of low dirt berms supporting sparse non-native plant cover, including crabgrass (*Digitaria* sp.), London rocket (*Sisymbrium irio*), and nettleleaf goosefoot (*Chenopodium murale*). The active and previously farmed areas would be included in the alternative solar fields.

Riparian scrub occurs on approximately 38 acres, almost all of which is adjacent to the river in the southern portion of the site and along the C Canal where it traverses disturbed saltbush scrub in the southwest corner of the site. This habitat is comprised of a mix of black willow (*Salix gooddingii*), arrowweed (*Pluchea sericea*), and tamarisk (*Tamarix* sp.), along with presence of cattails (*Typha* sp.) in the wetter areas, and

occasional horsetail (*Equisetum* sp.). This area would be avoided by the solar field arrays.

Arrowweed scrub occurs on approximately 82 acres in the south and southwestern portions of the site. This habitat consists primarily of arrowweed, with some areas supporting a mix of arrowweed, tamarisk, four-wing saltbush (*Atriplex canescens*), and other saltbush species (*Atriplex* spp.). This area would be avoided by the solar field arrays.

Desert saltbush scrub occurs on approximately 35 acres, consisting of approximately nine acres of undisturbed desert saltbush scrub and 26 acres of disturbed desert saltbush scrub located in the southwestern corner of the site. Undisturbed desert saltbush scrub consists of habitat with moderate to dense coverage by saltbush (*Atriplex* spp.), while disturbed saltbush scrub consists primarily of old alluvial deposits that appear to have been cleared of vegetation in the past and are still recovering. Shrub cover in these disturbed areas is approximately five to ten percent, comprised of various species of saltbush, as well as occasional creosote bush (*Larrea tridentata*) and arrowweed, while herbaceous cover is approximately 35 to 45 percent, consisting primarily of Mediterranean grass (*Schismus barbatus*) with occasional plicate coldenia (*Tiquilia plicata*) and Russian thistle (*Salsola tragus*).

Disturbed habitat comprises approximately 126 acres of land in the southwestern corner of the site that has been cleared of vegetation and supports sparse coverage by non-native species, as well as areas west of the residential area, including areas formerly used for camping and illegal dumping. This area would be avoided by the solar field arrays.

Developed land comprises approximately 34 acres at the southern terminus of Neighbors Boulevard, comprising approximately 26 acres of residential development and eight acres of ongoing sand/gravel mining along the north side of the river. This area would be avoided by the solar field arrays.

Special Status Species Special status species observations have been reported to the CNDDB within five miles of the alternative site (Table 2). These CNDDB records include two non-listed, special status plant species, bitter hymenoxys (*Hymenoxys odorata*) and Wiggins cholla (*Cylindropuntia wigginsii*), three listed animal species, federally and state listed endangered razorback sucker (*Xyrauchen texanus*), federally endangered and state threatened Yuma clapper rail (*Rallus longirostris yumanensis*), and federal candidate and state endangered western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), as well as eight non-listed special status animal species, Couch's spadefoot (*Scaphiopus couchii*), vermillion flycatcher (*Pyrocephalus rubinus*), Yuma myotis (*Myotis yumanensis*), Townsend's big-eared bat (*Corynorhinus townsendii*), pallid bat (*Antrozous pallidus*), American badger (*Taxidea taxus*), and Colorado River cotton rat (*Sigmodon arizonae plenus*).

Alternatives Table 2 California Natural Diversity Database Records for Special Status Species within Five Miles of the Gabrych Alternative Site

Common Name *Scientific Name*	Status State/Fed/CNPS/BLM	Occurrence Within 5 Miles of Gabrych Alternative Site
PLANTS		
Bitter hymenoxys *(Hymenoxys odorata)*	--/--/List 2/--	Reported approximately 2.5 miles west of the site.
Wiggins cholla *(Cylindropuntia wigginsii)*	--/--/List 3.3/--	Reported approximately 2.5 miles west of the site.
Razorback sucker *(Xyrauchen texanus)*	SE/FE/--/--	Reported approximately 1 mile southwest of the site and 2.5 miles west of the site.
Couch's spadefoot *(Scaphiopus couchii)*	SSC/--/--/S	Reported approximately 2.5 miles west of the site.
Yuma clapper rail *(Rallus longirostris yumanensis)*	ST/FE/--/--	Reported approximately 2 miles southwest of the site in a natural meander of the Colorado River, west of the channelized river.
Western yellow-billed cuckoo *(Coccyzus americanus occidentalis)*	SE/FC/--/--	Reported along the eastern edge of the site, in riparian habitat associated with the river.
Vermillion flycatcher (*Pyrocephalus rubinus*)	SSC/--/--/--	Reported approximately 2.5 miles west of the site.
Yuma myotis (*Myotis yumanensis*)	--/--/--/S	Reported along the southern boundary of the site, where Neighbors Boulevard crosses the river.
Townsend's big-eared bat (*Corynorhinus townsendii*)	SSC/--/--/S	Reported approximately 2.5 miles west of the site.
Pallid bat (*Antrozous pallidus*)	SSC/--/--/S	Reported approximately 2.5 miles west of the site.
American badger (*Taxidea taxus*)	SSC/--/--/--	Reported approximately 2.5 miles west of the site.
Colorado River cotton rat (*Sigmodon arizonae plenus*)	SSC/--/--/--	Reported approximately 2.5 miles west of the site.

Status Codes (Source: CDFG 2009**):**

Federal FE - Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT - Federally listed threatened: species likely to become endangered within the foreseeable future

State SE - State listed endangered
ST = State listed threatened
SSC = Species of special concern

California Native Plant Society (CNPS)
List 1B - Rare, threatened, or endangered in California and elsewhere
List 2 - Rare, threatened, or endangered in California but more common elsewhere
List 3 - Plants which need more information
List 4 - Limited distribution – a watch list
0.1 - Seriously threatened in California (high degree/immediacy of threat)
0.2 - Fairly threatened in California (moderate degree/immediacy of threat)
0.3 - Not very threatened in California (low degree/immediacy of threats or no current threats known)

U.S. Bureau of Land Management (BLM)

S = Sensitive

BLM Manual § 6840 defines sensitive species as "…those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that federal listing may become necessary, or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats." <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitiveAnimals.pdf>

Northern harrier was the only special status species observed on the alternative site during the field reconnaissance. There are other special status plant and animal species with potential to occur on the alternative site (Appendix A), but the primary species of concern are the desert tortoise and burrowing owl. The desert tortoise is unlikely to occur on the alternative site as native habitat is limited and is isolated from other potential habitat areas. Special status species most likely to use the site are species associated with foraging in agricultural fields (e.g., burrowing owl), and bird species associated with riparian habitat along the river. There is moderate potential for burrowing owl to use the site for foraging; owls also may inhabit burrows in berms constructed along irrigation canals, though no burrows were observed during the field reconnaissance.

NECO Habitat Management Areas. The Gabrych Alternative occurs just outside of the NECO planning area and does not occur within or adjacent to any NECO Wildlife Habitat Management Area (WHMA; BLM and CDFG 2002).

Landforms. The Gabrych Alternative is located just southeast of the NECO planning area. The nearest NECO landforms are cultivated lands, as shown on Map 3-4 of the NECO (BLM and CDFG 2002).

Critical Habitat. No critical habitat for special status plant or animal species occurs on or adjacent to the Gabrych Alternative. The site is located just southeast of the NECO planning area; the NECO Desert Tortoise Habitat Model (BLM and CDFG 2002) shows low quality desert tortoise habitat (potential value of 0) adjacent to the site.

Environmental Impacts

Construction. It is expected that the facility could be sited on the least sensitive 1,800 acres of the 2,137-acre Gabrych Alternative site. All riparian areas and native vegetation communities in the southwestern corner of the site could be avoided. Potential impacts may still occur to canals, depending on the site design, which may result in impacts to waters of the State and/or waters of the U.S.

It is unlikely that any special status plant species occur on site, and if so, they could be avoided by constructing the facility outside of the native vegetation areas in the southwestern corner of the alternative. Few impacts to special status animal species would be expected because the alternative site is largely active agricultural land and native habitat along the river and in the southwestern corner could be avoided while still having the minimum 1,800 acres needed for facility construction. However, a northern harrier was observed foraging on site, and burrowing owl, which is known to use agricultural land for foraging, also may be affected if it is present.

Two special status species documented in CNDDB records could be affected if riparian habitat along the river and in the southwestern corner is impacted. These include western yellow-billed cuckoo and Colorado River cotton rat. Impacts to razorback

sucker are not anticipated as this species inhabits the Colorado River and is not expected to occur on site. Several species of bats may forage along the river, but are not anticipated to be affected by facility construction. There is also some potential for special status plant species to occur in the native habitat areas in the southwestern corner. These include Harwood's milk-vetch, desert unicorn plant, Abrams spurge, and dwarf germander.

Wildlife movement across the site would be impeded by project development but would not affect overall wildlife movement in the area, as movement is likely to be concentrated along the river corridor.

Additional impacts to vegetation communities, and possibly special status species, would occur due to the construction of linear facilities (e.g., transmission lines) associated with a solar project on the alternative site. However, the transmission interconnection would traverse agriculture lands before reaching the CDD Designated Utility Corridor, so impacts caused by the transmission interconnection are expected to be reduced.

General Construction Impacts to Wildlife. Any wildlife residing on the Gabrych Alternative site would potentially be displaced, injured, or killed during project construction activities. Animal species in the project area could fall into construction trenches, be crushed by construction vehicles or equipment, or be harmed by project personnel. In addition, construction activities may attract predators or crush animal burrows or nests.

Migratory/Special Status Bird Species Impacts. The Gabrych Alternative site provides foraging, cover, and/or breeding habitat for migratory birds. Project construction could impact nesting birds in violation of the Migratory Bird Treaty Act.

Spread of Noxious Weeds. Construction of a solar project at the Gabrych Alternative site could result in the introduction and/or dispersal of invasive or exotic weeds. The permanent and temporary earth disturbance adjacent to native habitats increases the potential for exotic, invasive plant species to establish and disperse into native plant communities, which leads to community and habitat degradation.

Excessive Noise. Noise from construction activities on the Gabrych Alternative site could temporarily discourage wildlife from foraging and nesting immediately adjacent to the project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction activities could reduce the reproductive success of nesting birds.

Operational Impacts. Operation of transmission lines associated with a solar project on the alternative site could result in increased avian mortality due to collision with the new transmission lines.

An increased incidence of accidental wildfire is also a possibility during operation (although the potential is low) from downed transmission lines. Additionally, there would be the potential for edge effects to special status animal species in surrounding habitat areas from operational night lighting or noise. Furthermore, the desert tortoise could be subjected to increased predation from common ravens (*Corvus corax*; observed during

the reconnaissance on alternative site), which may increase in numbers along the transmission interconnection where desert tortoise habitat is present.

Comparison to Proposed Project. Definitive conclusions about the amount of potential adverse impacts to biological resources in the absence of site-specific survey and project design information for the Gabrych Alternative site cannot be made. However, provided that riparian and other native habitat areas on the Gabrych Alternative site could be avoided, development of a solar project at the Gabrych Alternative site would impact fewer biological resources compared to the GSEP footprint because development of the alternative site would occur primarily on agricultural land, whereas development of the Proposed Project site would occur primarily on land supporting native vegetation communities.

Furthermore, while a number of special status plant and animal species have been reported to the CNDDB within five miles of the Gabrych Alternative site, these are primarily associated with the Colorado River as well as riparian areas east of the City of Palo Verde. Burrowing owl, loggerhead shrike, and northern harrier are the special status species most likely to be affected if the agricultural lands were developed. The Proposed Project footprint also may support these same species, in addition to supporting special status plant species (Wiggins' cholla, Harwood's milk-vetch, and desert unicorn plant) and other special status animal species (desert tortoise and kit fox). Due to its location within a larger expanse of native habitat, which also connects to the Palen/McCoy Wilderness Area, the GSEP site has greater potential to support a variety of special status species, such as the American badger and wild burro, which are not expected to occur on the Gabrych Alternative site. If riparian and native habitats were avoided, development of a solar project on the Gabrych Alternative site would have fewer impacts to biological resources than development of a solar project on the Proposed Project site.

Cultural Resources

Environmental Setting. The Gabrych Alternative is located on agricultural land in Imperial County, California. The alternative site is located in the southern end of the Palo Verde Valley, on Holocene floodplain sediments along the west side of the lower Colorado River. The Valley is bordered by the Palo Verde Mesa to the northwest and west, which are Pleistocene Colorado River terraces partially covered with alluvial cobble pavements used by prehistoric inhabitants for toolstone. The Cibola Valley is south and the Triago Mountains are to the east of the alternative. The proposed Project is located approximately 25 miles northwest of the Gabrych Alternative, north of Interstate 10 midway between Blythe and Desert Center near Ford Lake.

The Palo Verde Valley is part of the northern extent of the Colorado Desert, subdivision of the greater Sonoran Desert. Conditions within the Colorado Desert are among the hottest in the United States. Annual rainfall totals within the Colorado Desert are among the lowest in the greater Sonoran Desert, averaging less than 2 inches (5 cm) per year in the Salton Trough and between 2 to 4 inches (5-10 cm) along the Colorado River (Crosswhite and Crosswhite 1982).

The Colorado River is the only perennial source water near the Gabrych Alternative area, which is one of the major river systems of North America. Springs in the area are

very rare and tend to flow seasonally. West of the project area, in the McCoy Mountains, is the McCoy Spring. McCarthy (1993) identified a “halo” type settlement pattern around these perennial waters sources, where site density and complexity are much higher near the permanent water sources. The area of the alternative site, prior to the construction of Boulder Dam, was susceptible to seasonal flooding, which left temporary lakes and a marsh environment (McDonald and Schafer 1998).

The prehistoric use of the Colorado Desert was apparently episodic, with long periods of low-intensity use of the land during particularly arid times. The earliest inhabitants of the region were highly mobile hunter-gatherers exploiting a variety of plants and animals. The settlement patterns of these Late Pleistocene and Early Holocene inhabitants suggest that they preferred to live along the shores of prehistoric lakes and on mesas near perennial washes (Schaefer and Laylander 2007). Roughly 7,000 years ago, local pluvial lakes began to evaporate and settlement shifted to the Colorado River and to perennial springs in the mountains and valley floors.

A number of ethnographically documented culture groups are associated with the Palo Verde Valley through historic use and oral history. These include the Mohave, Halchidhoma, Quechan, and Chemehuevi, along the lower Colorado River, and the Cahuilla of the western deserts and mountains (Bean 1972; Bean and King 1974; Bean and Vane 1978; Fowler and Fowler 1971; Laird 1976; Rogers 1939, 1966; Schaefer 2003; Singer 1984), collectively referred to as Yuman. Control of the stretch of the Colorado River immediately adjacent to the alternative area was notably contentious, changing hands more than once in the Protohistoric period. Hostilities ended with Gold Rush and establishment of Fort Yuma and Mojave in the middle of the 19th century. The final conflict occurred in 1860, when the U.S. Army defeated the Mohave (Sherer 1994)

The west side of the Colorado River was also an important corridor for travel between southern and northern river groups, particularly the Quechan and Mohave. North-south running trails have been identified along the river as transportation routes as well as ceremonial ways linking key mountains, springs, and other landscape features (Stone 1981; Woods 1986). These prehistoric trails and important landscape features are frequently associated with rock and earth art, as well as small rock piles known as cairns. As well, trails headed west as part of a long-distance transportation corridor from the Colorado River to Lake Cahuilla and the Pacific Coast (Bean and Vane 1978, Davis 1961, King 1981, Sample 1950, Singer 1984).

Subsistence patterns of Yuman cultural groups were mixed, consisting of both small-scale agriculture supplemented by foraging, fishing and hunting. Agricultural strategies optimized the use of flood waters as means of providing moisture to the fields; seeds were dispersed after floodwaters receded. Cultivated crops included maize, beans, squash, melon and semi-wild grasses (McDonald and Schafer 1998).

The first documented exploration of the Colorado Desert by non-indigenous people occurred in the 16th century, but sustained Euro-American settlement of the region did not occur until the mid-19th century. The first recorded exploration of the interior Colorado Desert region was undertaken by Father Eusebio Francisco Kino, a Jesuit missionary, cartographer, and explorer. Starting in 1691, Kino established a string of

missions in northern Mexico and southern Arizona, finally reaching the Colorado River in 1702.

The first Americans to arrive in the Colorado Desert in any numbers were prospectors hunting for the next big gold strike (Rice et al. 1996; Morton 1977). Sustained economic development in the Colorado Desert region only began in the 1870s, and came to fruition in the early part of the 20th century. Development was dependent largely on two things: transportation and water. The first of these came in 1872, with the construction of the Southern Pacific Railroad from the ocean to the eastern edge California. The railroad was the single most important boost to mining in the southeastern Colorado Desert, offering convenient transportation of heavy mining equipment, supplies, and personnel.

Agriculture became an important industry, second only to mining, by the late 1850s. To transform arid land into productive farming and grazing lands, water was the fundamental key. Agriculture became an important industry in the Palo Verde Valley near Blythe during the early 20th century, based largely on diverting water from the Colorado River. Agriculture continues to be a significant contributor to the Blythe economy.

A records search for the alternative area, at the Eastern Information Center and the South Coastal Information Center of the California Historical Information System reveals less than two percent of the alternative site has been systematically surveyed. The records and literature search identified five studies within a one-mile radius of the project alternative site, all of which are within or immediately adjacent to the alternative site. These studies identified two built environment resources and one archaeological resource. The archaeological resource is a trail that was identified in historical documents, but has never been field checked. The built environment resources are canals, one of which transects the project area (P13-008401; Canal C).

Nearly 90 percent of the Gabrych Alternative has been disturbed by on-going agricultural activities since the 1930’s, in addition to the construction of canals, roads, and OHV activity. While much of the surface prehistoric archaeology has been impacted, a review of the literature suggests that the potential for prehistoric sites in such close proximity to the Colorado River is moderately high. However, intact sites are likely buried and would not be identified through surface inventory.

Environmental Impacts. The construction and operation of a solar facility on the Gabrych Alternative site may have impacts on buried sites or built environment resources eligible for the National Register of Historic Places (NRHP) or California Register of Historic Resources (CRHR). The majority of the 2,138 acre project APE is currently under cultivation or has been impacted by irrigation or other agricultural infrastructure. Analysis of aerial photographs (USDA 1939, 1953) shows that the area has been under cultivation since before 1953 and after 1939. Depth of agricultural disturbance likely varies between two and three feet. Approximately 233 acres of the project does remain relatively undisturbed, except for OHV, irrigation, and two-track impact. The likelihood of cultural resources present in this area, located within the western third of the project APE is moderate. Surface contours and aerial photos suggest that this area may have been a small back-water or cut-off channel, now in-

filled, which contained flowing water in 1939 and may have contained a rich array of floral and faunal resources. The possibility of such an environment with greater resource density implies a higher potential for significant archaeological prehistoric sites.

In prehistoric times, the Colorado River Floodplain habitat would have been particularly attractive to Native American groups due to the proximity of water. The local flood plain would have provided access to fertile agricultural lands ideal for small-scale agriculture. The river itself contains fish and attracts wildlife that would have provided a consistent food source. Also, because of increased soil moisture, plant resources would have been more diverse and dense than the surrounding deserts. These factors would have provided an attractive area for human populations; therefore, it is likely that settlements in the alternative area were more permanent and larger than the deserts around the Blythe area.

Sediments within the alternative area are of recent alluvial origin deposited by over-bank events of the Lower Colorado River. Without in-field analysis, it is difficult to assume the age and structure of the surface sediments; however, comparison with sedimentation models (Waters 1992) for large river flood plains suggests that vertical accretion of sediments within the alternative site area would be rather rapid suggesting high potential for buried prehistoric sites. Further, depositional energy in such settings is low, especially with increasing distance from the channel, and therefore the potential for intact subsurface sites would be high. The potential for buried archaeological prehistoric sites at the Gabrych Alternative site, therefore, is high and any ground disturbing activities below the depth of agricultural disturbance could disturb significant archaeological deposits.

Built environment resources in the alternative site area consist of irrigation works, specifically a drainage canal (P13-008401), several residences or farms, and plowed fields. The drainage canal, also named Canal C, transects the western quarter of the alternative area. According to an aerial photograph (USDA 1939) portions of the canal were built prior to 1939. Later, as observed on a 1953 aerial photograph, the canal was extended to a small lake south of the alternative area. Between 1939 and 1953 a second canal, D-21-1, which appears to be a spur or feeder to Canal C, was constructed and supplies water to the southern and eastern portion of the alternative site area. Other canals constructed prior to 1953may be present; however, it is difficult to discern from the aerial photographs. Two residences appear to have been built after 1939 (USDA 1939) showing up on the 1953 aerial photograph and the 1975 Palo Verde, CA 7.5’ USGS quadrangle. In the late 1930’s, the entire alternative area was in its natural state. By 1953, about one-third of the alternative site area had been cleared for agriculture, mostly in the central and southeastern portions of the alternative site area.

One prehistoric site was identified in the records search area. CA-IMP-877 is a historical period Indian trail. The site location was taken from a mid-1800’s GLO map; however, the exact location is not known and its assumed location is near the western edge of the alternative area. Due to agricultural activity of the 20th century, it is likely that the site is no longer extant. No other prehistoric sites have been recorded in the area.

Comparison to Proposed Project. The development of a solar facility on the Gabrych Alternative would likely have fewer impacts than those of the Proposed Project near Ford Lake. The cultural resources survey of the Proposed Project found 21 archaeological sites (5 historic, 15 prehistoric, and 1 multicompenent) and two built environment sites within the project APE. Of the 21 sites, two (CA-RIV-9072 and CA-RIV-9224/H) are potentially eligible for inclusion on the National Register of Historic Places. Additional analysis of built resources of the canals and agricultural residences may find that these resources are eligible for inclusion on the CRHP and NRHP. Geoarchaeological studies of the Proposed Project indicate that the entire area is highly sensitive for buried cultural resources, particularly on the southern side closer to the Ford Lake. With the exception of 233 acres, the entire surface of the Gabrych Alternative has been plowed or impacted by other agricultural activities, thereby destroying the surface component of any late period cultural resources present in the APE throughout the remaining 1,905 acres of the alternative. Thus the potential for finding new significant sites during a Class III surface inventory is greatly reduced. Surface sediments within the alternative site are of a recent Holocene age and likely low energy based on a cursory map-based geoarchaeological investigation of the area, suggesting that the potential for buried intact cultural resources is high. Impacts to potential, undiscovered subsurface archaeological sites at both the Gabrych Alternative and Proposed Project are therefore comparable. While, analysis shows that the development of the Gabrych Alternative would likely impact fewer surface cultural resources, more site-specific details about cultural resources resulting from an intensive survey of the alternative would be needed to support this comparison.

Hazardous Materials Management

Environmental Setting. The topography of the Gabrych Alternative site is essentially flat, as are the immediately surrounding areas. Sensitive receptors are present within the Gabrych Alternative site although the residential community located in the southern portion of the alternative site would be avoided by the solar filed layout. This notwithstanding, the residential community would be located within 1,000 feet of the portion of the Gabrych Alternative site that would be required for the solar facility.

Access to the Gabrych Alternative would likely be via Interstate 10 to Neighbors Boulevard. At Neighbors Boulevard, transport would turn south for approximately 12 miles through primarily agriculture lands.

Environmental Impacts. Hazardous materials use at the Gabrych Alternative, including the quantities handled during transportation and disposal, would be the same as those of the proposed project. As stated in the **Hazardous Materials** section for the proposed project, hazardous materials used during the construction phase of the project would include heat transfer fluid (HTF), diesel fuel, mineral insulating oil, lube oil, and small quantities of solvents and paints. No acutely toxic hazardous materials would be used on site during construction, and none of these materials pose a significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical states, and/or their environmental mobility.

Hazardous materials will be used and stored on site during the operation of the project, including 2 million gallons of HTF in the solar trough system. As stated in the **Hazardous Materials** section, Therminol VP1 is the HTF that will be used in the solar

panels to collect solar heat and transfer it in order to generate steam to run the steam turbines. Therminol is a mixture of 73.5% diphenyl ether and 26.5% biphenyl, and is a solid at temperatures below ~54 °F. Therminol can therefore be expected to remain liquid if a spill occurs. While the risk of off-site migration is minimal, Therminol is highly flammable and fires have occurred at other solar generating stations that use it. Isolation valves would be placed throughout the HTF piping system. They will be designed to automatically block off sections of the piping in which a loss of pressure is detected (GSEP 2009). It appears that the placement of additional isolation valves in the HTF pipe loops throughout the solar array would add significantly to the safety and operational integrity of the entire system by allowing a loop to be closed if a leak develops in a ball joint, flex-hose, or pipe, instead of closing off the entire HTF system and shutting down the plant. In order to ensure that HTF leaks do not pose a significant risk, a condition of certification which would require the project owner to install a sufficient number of isolation valves that can be either manually or remotely activated would be required, as with the proposed BSPP.

A natural gas fueled auxiliary boiler would be used to support both freeze protection and rapid start-up of each of the two 125 MW plants each morning. As with the proposed GSEP site, the risk of a fire and/or explosion on site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) code 85A requires both the use of double-block and bleed valves for gas shut off and automated combustion controls. These measures will significantly reduce the likelihood of an explosion in gas-fired equipment. The safety management plan proposed by the applicant would address the handling and use of natural gas, and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

Transportation of hazardous materials to the Gabrych Alternative site would require passing near residences located in the Palo Verde Valley. The transportation would be on Interstate 10 and Neighbors Boulevard. Neighbors Boulevard has few residences located in the vicinity as it primarily traverses agricultural lands.

Comparison to Proposed Project. The hazardous materials that would be used at the Gabrych Alternative site would be the same as those used at the proposed GSEP site; however, the Gabrych Alternative site has a greater number of sensitive subgroups or residences nearby. As such, the potential impacts at the Gabrych Alternative would likely be somewhat greater than at the proposed site. With adoption of the proposed conditions of certification, the Gabrych Alternative would comply with all applicable laws, ordinances, regulations, and standards (LORS) and result in no significant impacts to the public.

Public Health and Safety

Environmental Setting. The Gabrych Alternative site is located in an isolated area dedicated to farming and adjacent to the Colorado River and recreational areas. The nearest residences are located approximately 500 to 1,000 feet from the alternative site. There are no nearby schools or other sensitive receptors.

Environmental Impacts. While the meteorological conditions and topography at the site are not exactly the same as at the proposed GSEP site, they are similar enough that the results of air dispersion modeling and a human health risk assessment for the Gabrych Alternative site would be expected to be very similar to that for the proposed site. The cancer risk and hazard indices are much below the level of significance at the point of maximum impact, so the project would be unlikely to pose a significant risk to public health at this location.

Two wet cooling towers for each power block are proposed by the applicant to cool ancillary equipment. In addition to being a source of potential toxic air contaminants, the possibility exists for bacterial growth to occur in the cooling towers, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in manufactured water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' Disease, which is similar to pneumonia. Additional information regarding legionellosis can be found in the **Public Health** section of the RSA. With the incorporation of conditions of certification such as those recommended in the **Public Health** section this impact would be less than significant.

Comparison to Proposed Project. There is no substantial difference in public health between this location and the proposed site.

Soil and Water Resources

Soils in the Gabrych Alternative site include Cibola, Gilman, Glenbar, Holtville, Imperial, Indio, Meloland, Ripley, and Rositas, much of which prime farmland (Soil Survey Staff 2009). These soils are formed in mixed alluvium and in sandy deposits blown from alluvium and in gravelly to silty clay loam (CPUC 2006). Soil types include gravelly to sandy loam, silty clay loam to clay loam, and fine sand, very fine sand, silt loam and loam. Soils containing high percentages of fine sands and silt and that are low in density are generally the most erodible. Approximately 1,800 acres of land on this alternative site would be disturbed by the construction.

Imperial-Glenbar-Gilman soils are the soils of the adjacent agricultural area of Imperial County. Wind erosion potential is moderate with high runoff erosion potential. Permeability is relatively low. These soils are highly productive for farmland. Glenbar and Gilman soils have been listed by the California Department of Conservation as meeting the criteria for prime farmland. Imperial soils are designated by the same agency as meeting the criteria for farmland of statewide importance.

The Gabrych Alternative site lies within the Palo Verde Valley Groundwater Basin part of the Colorado River Hydrologic Region. The site is located on agriculture land. Five named irrigation canals cross the site: C Canal, D-23-1 Canal, D-23-1-3 Canal, D-23-1-4 Canal, and D-23-1-5 Canal. Approximately 7 acres of the Colorado River occur within the southern portion of the site, and is jurisdictional to the ACOE and CDFG. These acres would be avoided by the alternative.

A small stand of riparian scrub occurring along the D-23-1-3 Canal in the northeast portion of the site, as well as more extensive riparian habitat occurring along the C Canal in the southwestern portion of the site and along the Colorado River in the southern portion of the site would be considered waters of the state under the

jurisdiction of the CDFG and may be considered waters of the U.S. under the jurisdiction of the ACOE.

The Palo Verde Irrigation District (PVID) is the sole entity in Palo Verde with rights to divert and use Colorado River water. PVID annually provides irrigation water to approximately 93,000 acres of farmland, primarily in the valley, with water diverted from the Colorado River. A major portion of the water that PVID diverts is consumed by the crops it irrigates. The portion of the applied water that is not consumed by crops percolates past the root zone to recharge the underlying aquifer.

Topography on the Gabrych Alternative site is relatively flat, with elevation ranging from approximately 200 to 300 feet above mean sea level. The Gabrych Alternative would use irrigation district water as the water supply; however, dry cooling would be required to reduce any impacts to Colorado River water. Unless reclaimed water could be used for construction purposes, it is likely that the water used during construction of the project would be offset by fallowing surrounding agricultural lands (a Water Conservation Offset Program) or by converting the Gabrych Alternative to non-agricultural uses.

Environmental Impacts

Soil Erosion Potential by Wind and Water. As discussed in the **Soils and Water** section of this RSA, 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 water-dependent 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 loading to nearby receiving waters. Although access to the site would be from existing roads, construction of the solar fields would require substantial grading as in the proposed project. While the volume of earth movement required at the alternative site is unknown, the topography and slope of the Gabrych Alternative site are less severe than at the proposed GSEP site and have already been tilled for agriculture.

Being situated in an area near the banks of the Colorado River, portions of the Gabrych Alternative would be subject to sediment deposition and flooding from large floods on crossing the site. This impact would primarily affect the project itself, but the adverse effect could be significant. It may not be possible to practically mitigate this impact except by mapping and avoiding the severe hazard areas, which would result in a smaller alternative.

As at the GSEP site, grading plans, a Storm Water Pollution Prevention Plan (SWPPP), and a Drainage Erosion and Sediment Control Plan (DESCP) would be required. Due to the flat terrain and existing disturbed condition of this site, the SWPPP and DESCP would likely be sufficient to mitigate soil erosion impacts to a level less than significant.

Project Water Supply. The Gabrych Alternative site would require the use of water from the Palo Verde Irrigation District. Because of this, it is likely that use of water at the Gabrych Alternative site would require a Water Conservation Offset Program intended to offset the water required during project construction. As with the proposed GSEP site, the applicant would need to comply with Conditions of Certification that would require

acquisition of entitlements to Lower Colorado River water to mitigate the project's contribution to impacts to the Colorado River, as well as comply with the Palo Verde Irrigation District regulations. However, the Palo Verde Irrigation District has an existing program with the Metropolitan Water District transferring saved water to urban Southern California. Should the project incorporate dry cooling, the amount of water used at the Gabrych Alternative site would be reduced from the current agriculture use and would potentially be applicable for inclusion in the Metropolitan Water District project.

Wastewater/Storm Water Quality. Storm water runoff from the site during construction and operation could have similar impacts as proposed for the proposed project. However, the Gabrych Alternative would be located near the Colorado River and would potentially have greater contamination concerns than at the proposed GSEP site. The site construction will require a SWPPP which will specify Best Management Practices (BMPs) to minimize or eliminate water contamination.

As stated in the **Soil and Water** section of the RSA, the Land Treatment Unit (LTU) on the site would be used to treat soil that is impacted with Therminol® VP1 HTF, as a result of minor leaks or spills that occur during the course of daily operational or maintenance activities. At ambient temperatures, HTF is a highly viscous material that is virtually insoluble in water. Operation of an LTU is not expected to impact surface water or groundwater quality beneath the site. The LTU would be surrounded on all four sides by berms that would protect the LTU from surface water flow. Because of the viscous and insoluble nature of HTF, it is not likely to mobilize from the soil downwards to the water table. The LTU would be operated under the requirements of CCR Title 23, Division 3, Chapter 15, and Title 27, Section 2000 et seq. and Title 23, Section 2510 et seq. Further discussion regarding the HTF and any HTF leaks can be found in the **Soil and Water** section.

Sanitary waste disposal would likely be through on-site facilities as for the proposed project. No significant adverse impact is anticipated.

Comparison to Proposed Project. The level terrain with minimal existing drainage on the Gabrych Alternative would result in impacts similar to the proposed project. With incorporation of approximate BMPs, impacts to water quality would likely be similar as with the proposed project. With the incorporation of dry cooling and water conservation offsets, impacts due to water use would be reduced when compared with the proposed project. Unlike building at the proposed GSEP site, the Gabrych Alternative would not create impacts to Chuckwalla Wind Transport Corridor, nor would it create impacts to the Palen-McCoy Wind Transport Corridor.

Land Use

Environmental Setting. The Gabrych Alternative is located west of the Colorado River, in eastern Imperial County, just south of the Riverside County border. The Gabrych Alternative is crossed by Neighbors Boulevard and would be less than 1,000 feet north of a residential community. The Cibola National Wildlife Refuge is located three miles south of the site in Arizona. Federal land under BLM jurisdiction is located approximately five miles west of the site and would be crossed by the transmission interconnection. The Palo Verde Landfill, closed in 2007, is located approximately 4.5 miles southwest of the Gabrych Alternative site, on Stallard Road. Portions of the

Gabrych Alternative belonged to the BLM but were part of a land exchange with the SF Pacific Properties INC, a subsidiary of the Catellus Development Corporation as succeeded by Eugene Gabrych and Marian Gabrych (BLM 2006).

The site consists of primarily fallow and active agricultural land. The surrounding area consists of primarily agriculture and the rural community of Harvey's Fishing Hole and Palo Verde. The Gabrych Alternative was designated as Agriculture in the Land Use Plan, updated in March, 2007 (Imperial County 2007).

According to the Imperial County General Plan Land Use Element, industrial uses are not permitted on agricultural lands except for those directly associated with agricultural products and processes. Electrical and other energy generating facilities are considered heavy industrial uses except for geothermal, hydroelectric, wind and solar facilities which may be regulated differently than other types of power plants. Geothermal plants may be permitted in agricultural lands with a conditional use permit subject to zoning and environmental review.

In April 2009, Imperial County and the IID signed a Joint Resolution for the Creation of an Imperial Valley Renewable Energy Development Program to promote renewable energy resources in Imperial Valley (Imperial County 2009). This resolution encourages the growth of renewable energy in Imperial Valley and focuses on creating a data bank where developers, investors, and government regulators can access available data about permitting processes and encourages both the IID and Imperial County to maximize development of renewable resources in a manner consistent with sound environmental and land use planning principles (Imperial County 2009). However, because the proposed project is a result of a Power Purchase Agreement between San Diego Gas & Electric and the Applicant, development of this project would not contribute to Imperial County's energy supplies. As such, development of the Agricultural Lands Alternative could be inconsistent with the IID and Imperial County Joint Resolution.

Agriculture. The Gabrych Alternative site is comprised of active and previously farmed agricultural lands. The Gabrych Alternative consists of approximately 960 acres of Prime Farmland, 680 acres of Farmland of Statewide Importance, and 160 acres of Unique Farmland. Prime Farmland includes lands with the best combination of physical and chemical features able to sustain long-term agricultural production that has been used for irrigated agriculture within the previous four years. Farmland of Statewide Importance is similar to Prime Farmland with some shortcomings such as a greater slope or lesser ability to store soil moisture. Unique Farmland consists of lesser quality soil for the production of agriculture crops and while usually irrigated may include non-irrigated orchards or vineyards. The Gabrych Alternative parcels are not under Williamson Act contracts.

Aerial spraying (i.e., crop dusting) is used to control insects, weeds, and diseases that may affect crops in the Imperial Valley. Aerial spraying occurs in those areas of the Imperial Valley actively cultivated with field crops. Aerial applicators fly at low elevations and sometimes at speeds in excess of 100 miles per hour. Fatalities associated with aerial applicators can partly be attributed to flying at low altitudes and high speeds, as well as the presence of obstacles such as power lines, trees, towers, or buildings within the flight area (CPUC, 2008). Where transmission lines exist in an agricultural area, pilots

must fly over, beside, and (occasionally) under the lines to complete aerial spraying activities. Transmission lines and towers thus present a substantial obstacle to be avoided during aerial spraying operations, and require additional attention from the pilots. The transmission interconnection would require a new transmission line crossing approximately 4 miles of agriculture lands.

Sensitive Land Uses. As stated above, the Gabrych Alternative site would be located north of a small rural community, Harvey's Fishing Hole, located at the intersection of Neighbors Boulevard and the Colorado River.

Transmission Interconnection. The transmission interconnection would trend westward for five miles through primarily agriculture lands until reaching the CDD designated utility corridor at which point the transmission interconnection would turn north. The transmission interconnection would then trend northward for approximately 12 miles adjacent to the WAPA 161 kV transmission line until reaching the proposed SCE Colorado Substation. Where the transmission interconnection would cross federal land under the management of the BLM, it would remain within a CDD designated utility corridor and would not require a land use plan amendment.

Environmental Impacts. Because of the desire to consider use of disturbed lands for large solar projects, the Gabrych Alternative site is located primarily on active and non-active agricultural lands. The Imperial County General Plan states that, in general, industrial uses are not permitted on agricultural lands; however, some renewable energy is allowed on agricultural lands with a conditional use permit subject to zoning and environmental review.

The construction and operation of the GSEP project at the Gabrych Alternative site would result in the conversion of up to 1,800 acres of actively-used agricultural land to renewable energy production. The construction and operation of the solar power plant would eliminate the existing agricultural operations and foreseeable future agricultural use on this site. This loss of agricultural lands is a potentially significant impact, and would likely require mitigation to offset the loss. The California Agricultural Land Evaluation and Site Assessment (LESA) Model was used to assess impacts to the Gabrych Alternative site.

The California Agricultural LESA Model prepared by the California Department of Conservation is an optional model to use in assessing impacts on agriculture and farmland (CCR 2006).The formulation of a California Agricultural LESA Model is the result of Senate Bill 850 (Stats. 1993, ch. 812, section 3), which charged the Resources Agency, in consultation with the Governor's Office of Planning and Research, with developing an amendment to Appendix G of the California Environmental Quality Act (CEQA) Guidelines concerning agricultural lands. Such an amendment is intended "to provide lead agencies with an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process" (Public Resources Code Section 21095).

The California Agricultural LESA Model is composed of six different factors. Two "Land Evaluation" (LE) factors are based upon measures of soil resource quality. Four "Site

Assessment" (SA) factors provide measures of a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100-point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. It is this project score that becomes the basis for making a determination of a project's potential significance, based upon a range of established scoring thresholds (DOC 1997).

The LESA Model for the Gabrych Alternative site was conducted in accordance with the detailed instructions provided in the LESA Model Instruction Manual. The LESA score is based on a scale of 0 to 100. The Final LESA score for the Gabrych Alternative is 73. Based on the California Agricultural LESA Thresholds, a score of 73 would result in adverse effects due to the permanent conversion of 1,800 acres of Farmland. As stated above, agriculture is the most important industry in Pale Verde Valley. This amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. The completed LESA Model worksheets for the Gabrych Alternative parcels are included within **APPENDIX Alts-1** at the end of this section.

Construction activities for the alternative would create temporary disturbance to residential areas (i.e., heavy construction equipment on temporary and permanent access roads and moving building materials to and from construction staging areas). Conditions of certification to reduce noise and air quality impacts are presented in the Noise and Air Quality sections of this RSA for the proposed GSEP site. Because this disturbance would be temporary at any one location, the impacts would likely be less than significant.

Comparison to Proposed Project. Selecting the Gabrych Alternative site would not require the use of BLM land, and would not require a land use plan amendment. However, use of the Gabrych Alternative site would result in greater impacts to agricultural land than the project site, including the loss of Prime Farmland and Farmland of Statewide Importance and the loss of approximately 1,800 acres of active farmland resulting in a significant impact per the LESA model. Loss of agricultural lands would likely require conditions of certification to offset the loss of these lands.

Recreation and Wilderness

Environmental Setting. The Gabrych Alternative site would not be located adjacent to or near any wilderness areas. As such impacts to wilderness will not be addressed.

The Gabrych Alternative would be located north of the Colorado River and approximately 3 miles north of the Cibola National Wildlife Refuge. The Colorado River is used for a variety of recreational opportunities including boating. Some of the Colorado River recreational opportunities near the Gabrych Alternative site include Taylor Ferry, an old, disused cable ferry; Gould Wash, a day use area; Harvey's Fishing Hole Boat Ramp, that includes campsites, boat rentals and repairs, fishing, and other amenities; and Cibola Farmers Bridge (CDBW 2010).

The Cibola National Wildlife Refuge is located in the floodplain of the lower Colorado River and surrounded by a fringe of desert ridges and washes. The refuge encompasses both the historic Colorado River channel as well as a channelized portion constructed in the late 1960's. Along with these main water bodies, several important backwaters are home to many wildlife species that reside in this portion of the Sonoran Desert. Recreational activities include fishing, hunting, and wildlife observation and photography (USFWS 2010).

Environmental Impacts. Project construction activities would create a number of temporary conditions that may impact recreationists travelling down the Colorado River. Noise, dust and heavy equipment traffic generated during construction activities would negatively affect a visitor's enjoyment of the recreation area. Disturbances to recreational activities would potentially cause a temporary reduction of visitation to Harvey's Fishing Hole as it is located immediately south of the Gabrych Alternative site; however, the impacts to any boaters on the river would be temporary until the boat had passed beyond the Gabrych Alternative.

As stated above, a solar project at the Gabrych Alternative site would have a direct impact on recreational users at Harvey's Fishing Hole due to the changes to the landscape in the immediate area, construction and operational noise, and overall change to the pastoral setting. Some proportion of recreational users may ultimately prefer to visit other areas due to the industrial views of the Gabrych Alternative site. To mitigate the potential negative effects of the changes to the viewshed, landscaping may be required, or recreational facilities that support these users may be improved or installed.

Comparison to Proposed Project. While the Gabrych Alternative site would be located near the Colorado River, frequently used for boating, the GSEP site would be near to BLM ACECs and wilderness areas, and the GSEP linears would cross one "open" route (as designated in the NECO Plan) . Additionally, impacts to recreation along the Colorado River would be temporary as recreationists would be traveling along the river and not remaining in one area. Because of this, impacts to recreation would be slightly less at the alternative site.

Noise

Environmental Setting. Generally low levels of ambient noise are expected along the Gabrych Alternative as this region is primarily for agriculture. However, ambient noise levels are expected to be elevated near Harvey's Fishing Hole.

Nearby sensitive receptors include the rural residences at Harvey's Fishing Hole, south of the Gabrych Alternative. The nearest residential area would be between approximately 500 to 1,000 feet south of the alternative site. There are no nearby sensitive receptors to the proposed site.

Environmental Impacts. As stated in the **Noise** section of this RSA, the construction of the GSEP would create noise, or unwanted sound. The character and loudness of this noise, the times of day or night at which 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.

The Gabrych Alternative site is located on land that is used for agriculture. Additionally, rural residences are located within 1,000 feet of the Gabrych Alternative within the town of Harvey's Fishing Hole. It is expected that operational noise would raise the ambient noise levels.

Comparison to Proposed Project. Building the GSEP at the Gabrych Alternative site would create a slightly greater impact than at the proposed site because of the closer proximity to a greater number of sensitive receptors (residences).

Socioeconomics and Environmental Justice

Environmental Setting. The Gabrych Alternative site is located in Imperial County, just south of the Riverside County border. The demographic characteristics of Riverside County are described in the **Socioeconomics and Environmental Justice** section of this RSA.

In 2000, as reported by the U.S. Census, the population of the Palo Verde/Harvey's Fishing Hole area was 287 people. Imperial County had a total population of 142,361 in 2000 and 161,867 in 2007 (California Department of Finance 2000 and Census Bureau). The unemployment rate for Imperial County was 24.5% in February 2009 (not seasonally adjusted). This is not full employment for Imperial County. Over the past few decades, full employment has been typically defined as approximately 4.0% to 5.5% unemployment. For California, the unemployment rate was 10.9% in February 2009 (not seasonally adjusted) (State of California Employment Development Department 2008a).

Environmental Impacts. Construction workers would most likely be from larger nearby cities such as Blythe. While there is limited housing available in the vicinity of the Gabrych Alternative site, workers could commute from Blythe, approximately 12 miles north of the Gabrych Alternative site. There are residential opportunities or amenities in Blythe in addition to campgrounds, RV parks, or motels (GSEP 2009a). Because it is unlikely that the construction workers would relocate to the immediate vicinity of the Gabrych Alternative site, this alternative would not cause a significant adverse socioeconomic impact on the area's housing, schools, police, emergency services, hospitals, and utilities.

There would be no adverse socioeconomic impacts since most of the construction and operation workforce is within the regional labor market area, and construction activities are short-term. Gross public benefits from the GSEP, including capital costs, construction and operation payroll, and sales taxes, should it be built at the Gabrych Alternative site, are likely to be similar to the benefits from GSEP at the proposed site, although some of the economic benefits would likely occur in Palo Verde, Imperial County as well as in Blythe, Riverside County. Section 73 of the California Revenue and Taxation Code allows a property tax exclusion for certain types of solar energy systems installed between January 1, 1999 and December 31, 2016. The components that would be excluded include the solar components such as mirrors, solar boiler, heat exchangers in addition to the storage devices, power conditioning equipment, transfer

equipment, and parts. As such, property tax income would not be expected to increase significantly from its current state.

Comparison to Proposed Project. The socioeconomic impacts of the GSEP at the Gabrych Alternative site would be similar to building and operating the project at the proposed site.

Traffic and Transportation

The Gabrych Alternative site is located south of I-10; access to the Gabrych Alternative site would be via Neighbors Boulevard off of I-10. Workers employed to construct the project at this alternative site would most likely commute from Blythe (12 miles) or the Coachella and Indio (up to 90 miles). Given the limited use of I-10 east of Palm Springs, added construction traffic on the I-10 would be unlikely to impact the level of service.

The Gabrych Alternative would be located approximately 1,000 feet north of Harvey's Fishing Hole, a public boating launch.

Environmental Impacts. Before construction could occur at the Gabrych Alternative site, a construction traffic control and transportation demand implementation program would need to be developed in coordination with Caltrans. This analysis may result in the need to limit construction-period truck and commute traffic to off-peak periods to avoid or reduce traffic and transportation impacts. These impacts would likely similar to those of the proposed project as both projects would require the use of I-10 and other smaller roads for access and are located adjacent to each other.

Glare. Similar to the proposed project, there is the potential for highly distracting diffuse glare from the project to affect nearby motorists. Staff developed Condition of Certification VIS-4, which requires mitigation in the form of including opaque privacy slats on the perimeter chain link fencing proposed by Applicant along the length of the project adjacent to Interstate 10. That measure would be adapted to this alternative along Neighbors Boulevard. Fewer motorists would be impacted by glare at the Gabrych Alternative site than at the proposed GSEP site; however, the rural community of Harvey's Fishing Hole would be potentially impacted by glare as it is located between 500-1,000 feet south of the project site.

Comparison to Proposed Project. Impacts to traffic and transportation at the Gabrych Alternative site would be similar to those at the proposed GSEP site.

Transmission Line Safety and Nuisance

Environmental Setting. The Gabrych Alternative site would connect with the SCE system at the proposed Colorado Substation through a new transmission line that would exit the alternative site and trend west for approximately 5 miles then turn north for approximately 12 miles The new transmission line would cross BLM land and active and fallow agricultural land and would be located adjacent to the existing WAPA 161 kV transmission line and would be located within an existing CDD designated utility corridor.

The transmission line would be within 500 feet of rural residences within the town of Palo Verde.

Environmental Impacts. Similar to the proposed project, this alternative site would not be likely to cause transmission line safety hazards or nuisances with implementation of conditions of certification such as those described in the **Transmission Line Safety and Nuisance** section of the RSA. The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current standard industry practices, and the potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

As with the proposed GSEP transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed lines' design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information.

Comparison to Proposed Project. The Gabrych Alternative site would require a shorter transmission line interconnection with the SCE transmission system; however, much of the GSEP transmission interconnection would be located on already existing poles as the conductor would be strung on poles erected for the Blythe Energy Transmission Line. While the electric and magnetic fields would be managed to an extent the CPUC considers appropriate, the transmission line would be located within 500 feet of approximately 15 residences. The transmission interconnection for the proposed site would not be located within 500 feet of any residential properties. This impact would be greater for the Gabrych Alternative site than for the proposed site.

Visual Resources

Environmental Setting. The Gabrych Alternative site is located on primarily private land surrounded by agricultural lands east of the town of Palo Verde in Imperial County. The rural community of Harvey's Fishing Hole is located south of the Gabrych Alternative site along the Colorado River. A small sand/gravel mining operation occurs just west of the residential area. The site is crossed by Neighbors Boulevard. This infrastructure introduces developed and industrial features to the otherwise visually open and rural setting.

Views from the Gabrych Alternative site to the north and west are pastoral, of agriculture lands. Views to the east and south are of the Colorado River and further views are also of agriculture lands and some open space in Arizona.

The linear facilities associated with the Gabrych Alternative site include a 230 kV transmission line approximately 17 miles long. The transmission lines would be primarily located in a CDD Designated Utility Corridor.

Environmental Impacts. As stated in the **Visual Resource** section, the Energy Commission staff, in coordination with BLM, used a standard visual assessment

methodology developed by California Energy Commission staff and applied to numerous siting cases in the past in this study. A description of this methodology is provided in **Appendix VR-1** for the proposed GSEP project**.**

The existing visible physical environmental setting and the anticipated visual change introduced by the proposed project are considered from representative, fixed vantage points. The likelihood of a visual impact is determined in this study by two fundamental factors: the susceptibility of the setting to impact as a result of its existing characteristics (reflected in its current level of visual quality, the potential visibility of the project, and the sensitivity to scenic values of its viewers); and the degree of visual change anticipated as a result of the project. These two factors are summarized respectively as *visual sensitivity* (of the setting and viewers), and *visual change* (due to the project).

With the addition of the project, views of the alternative site would change from an open and pastoral landscape to a substantially more industrial, highly altered one. The industrial landscape would be dominated by the eighteen hundred acres of solar troughs, approximately 30-feet tall. There would be no natural features to block the view of the solar facilities on any side. However, the alternative site would be located adjacent to a gravel mine which would have already introduced some built environment into the area.

The Gabrych Alternative site views would be prominent from Neighbors Boulevard for both northbound and southbound traffic, which is relatively minimal. Travelers would be immediately adjacent to the project, and there is little elevation or natural contouring to block views of the solar field. The GSEP would be located over 3 miles from the I-10 and would not be highly visible from the I-10.

The landscape surrounding the alternative site is within the Palo Verde Irrigation District and is flat, exhibits a prominent horizontal line, and is relatively non-descript. The more distant, angular mountains provide a backdrop of visual interest. Landform colors are tan to dark green. The overall landscape character and visual quality is predominantly pastoral in appearance with a few structures at Palo Verde and Harvey's Fishing Hole slightly visible above the vegetative line.

The alternative's 230 kV transmission line interconnection would introduce additional industrial character to this agriculture area; however, it would be partially located within a CDD Designated Utility Corridor and would be adjacent to an existing 161 kV transmission line for 12 miles. The Gabrych Alternative transmission line would be required to cross SR 78.

Comparison to Proposed Project. The Gabrych Alternative site is in a more developed and disturbed area compared with the proposed GSEP site. However, the Gabrych Alternative site would be expected to be visible to a greater number of viewers than the GSEP site and would create somewhat greater visual impacts.

The Gabrych Alternative transmission line would create a lesser visual impact than the GSEP proposed site transmission interconnection because it would not need to cross the I-10 to reach the substation, and would not be located adjacent to a heavily used freeway. The Gabrych Alternative transmission line would be required to cross SR 78;

however, this has a fewer number of viewers than the I-10. Both transmission lines would be adjacent to existing transmission lines.

Waste Management

Environmental Setting. In 2002, a leaking diesel fuel tank caused a sheen on the Colorado River just south of the Gabrych Alternative (OES 2002). The report filed by the California Fish & Game stated that the leak was caused by one of three 4,000 gallons tanks of diesel on a farm in Arizona across from Harvey's Fishing Hole (OES 2002). Additionally, because the site and surrounding area is used for agriculture, it is possible that the site has been contaminated by agriculture residues.

Environmental Impacts. Both nonhazardous and hazardous wastes would be created by the construction of the project at the Gabrych Alternative site in similar quantities as at the proposed site and would be disposed of at the same facilities as for the proposed project. The applicant would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction and would be required to comply with conditions of certification similar to those identified for the proposed site. The project at either the GSEP site or the Gabrych Alternative site would produce minimal maintenance and plant wastes.

As discussed in the **Waste Management** section of this RSA, preparation and construction of the two phases of the proposed solar project and its associated facilities would last approximately 37 months and generate both non-hazardous and hazardous wastes in solid and liquid forms. Before construction can begin, the project owner will be required to develop and implement a Construction Waste Management Plan per mitigation similar to the Condition of Certification proposed for the GSEP, to ensure that the waste will be recycled when possible and properly disposed of in landfills when necessary. As with the proposed GSEP project, construction activities would generate an estimated 40 cubic yards per week of non-hazardous solid wastes, consisting of scrap wood, steel, glass, plastic, and paper, and another 1 cubic yard per week of office-related waste. Of these items, recyclable materials would be separated and removed as needed to recycling facilities. Non-recyclable materials (insulation, other plastics, food waste, roofing materials, vinyl flooring and base, carpeting, paint containers, packing materials, etc.) would be disposed at a Class III landfill.

Non-hazardous liquid wastes would be generated during construction, and would include 200 gallons of sanitary waste per day. Sanitary wastes would be pumped to tanker trucks by licensed contractors for transport to a sanitary water treatment plant.

During construction, anticipated hazardous wastes include waste paint, spent construction solvents, waste cleaners, waste oil, oily rags, and waste batteries. Estimated amounts are 1 cubic yard of empty containers (per week), 175 gallons of oils, solvents, paint, and oily rags (every 90 days), and 10 batteries (per year). Empty hazardous material containers would be returned to the vendor or disposed at a hazardous waste facility; solvents, used oils, paint, oily rags, and adhesives would be recycled or disposed at a hazardous waste facility; and spent batteries would be disposed at a recycling facility. In addition, a one-time generation of 1,000 gallons of Heat Exchanger cleaning solvent (chelant type solution) would require disposal at a permitted hazardous waste facility (GSEP 2009a, pages 5.13-5).

The generation of hazardous waste requires a unique hazardous waste generator identification number. The hazardous waste generator number is determined based on site location and therefore, both the construction contractor and the project owner/operator could be considered the generator of hazardous wastes at the site. Therefore, the project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction. This would ensure compliance with California Code of Regulation Title 22, Division 4.5.

Comparison to Proposed Project. The environmental impacts of waste disposal at the Gabrych Alternative site would be similar to those at the proposed GSEP site.

Worker Safety and Fire Protection

Environmental Setting. The Gabrych Alternative site would be located within an area that is primarily agricultural and adjacent to the Colorado River. Although the Gabrych Alternative site is located in Imperial County, the nearest fire departments are located in Riverside County. The two nearest county fire stations are RCO Station #45, located at Blythe Air Base, 17280 W. Hobson Way, Blythe, and RCO Station #44, located at Ripley, 13987 Main Street, Ripley (RCFD 2010a). The Worker Safety and Fire Protection section in this SA/EIR provides more information regarding the Riverside County Fire Department. The fire risks of this alternative site would be similar to those of the proposed GSEP site as both have desert conditions.

Environmental Impacts. A solar plant at the Gabrych Alternative site would require a Project Demolition and Construction Injury and Illness Prevention Program and a Project Operations Safety and Health Program in order to ensure adequate levels of industrial safety. The applicant would also be required to provide safety and health programs for project construction, operation, and maintenance, similar to the requirements for the proposed project site. The Riverside County Fire Department and the Imperial County Fire Department would be contacted to assure that the level of staffing, equipment, and response time for fire services and emergency medical services are adequate.

Comparison to Proposed Project. The environmental impact of worker safety and fire protection at the Gabrych Alternative site would be similar to the proposed site although the response time would be expected to be better at the alternative site due to its proximity to the RCO Station #44.

Engineering Assessment for Gabrych Alternative

Facility Design

The design of a 250 MW project at the Gabrych Alternative site would be similar to that of GSEP at the proposed site. Staff-recommended measures may be appropriate to ensure compliance with engineering laws, ordinances, regulations, and standards applicable to the design and construction of the project.

Geology, Paleontology and Minerals

Environmental Setting. The Gabrych Alternative site is located near the southeastern edge of the Palo Verde Valley, a river valley of the Colorado River, in the Colorado Desert

Region. The Colorado Desert region lies mostly at a low elevation and consists of desert basins with interspersed northwest-trending mountain ranges. The Gabrych Alternative generally crosses alluvial plains and valleys. Geologic units underlain by the alternative site are primarily recent alluvium (Qal) or unconsolidated alluvial fan, river channel, and stream deposits consisting of silt, sand, clay, and gravel (CPUC 2007). Recent alluvium also includes recent floodplain deposits of the Colorado River (silt, sand, and clay).

The Gabrych Alternative site is located in an area of low seismic activity. No active faults cross the alignment or are located in the vicinity. The estimated peak horizontal acceleration for this alternative route is less than 0.2 g; therefore, this area should not experience strong groundshaking. The lack of strong groundshaking and deep groundwater elevations preclude liquefaction-related phenomena. This alternative is located on flat to gently sloping alluvial fans and alluvial plains that are not susceptible to landslides (CPUC 2007).

Liquefaction is the phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced, strong groundshaking. The susceptibility of a site to liquefaction is a function of the depth, density, and water content of the granular sediments, and the magnitude and frequency of earthquakes in the surrounding region. Saturated, unconsolidated silts, sands, and silty sands within 50 feet of the ground surface are most susceptible to liquefaction. Liquefaction-related phenomena include lateral spreading, ground oscillation, flow failures, loss of bearing strength, subsidence, and buoyancy effects (CPUC 2007). In addition, densification of the soil resulting in vertical settlement of the ground can also occur. As the Gabrych Alternative site is located less than 1,000 feet north of the Colorado River, liquefaction is considered a potential hazard (CPUC 2007). However, due to the low potential for strong groundshaking, liquefaction would likely occur only during a “great” earthquake (CPUC 2007).

One mineral resource site is located within the alternative site; a gravel pit surface mining operation owned by Empire Communities, LLC (BLM 2010). This mining facility would be avoided by the solar field layout.

The Gabrych Alternative site is expected to have a low potential for finding paleontological resources because it is primarily underlain by Holocene Alluvium and because it has been previously disturbed for agricultural practices.

Environmental Impacts. Minimal seismic ground shaking is expected at the Gabrych Alternative site because it is not located within a seismically active area and is not on a known fault line. The severity and frequency of ground shaking associated with earthquake activity at the Gabrych Alternative site is expected to be similar to that of the proposed site. However, the potential for liquefaction in this area is high due to anticipated depths of groundwater. As such, design criteria would be required for the Gabrych Alternative site in accordance with a design-level geotechnical report and California Building Code (2007) standards. Adequate design parameters for the facility would need to be determined through a site-specific evaluation by a Certified Engineering Geologist or Geotechnical Engineer. Impacts due to seismic hazards and

soil conditions, such as subsidence, would be addressed by compliance with the requirements and design standards of the California Building Code.

The paleontological sensitivity and potential to encounter significant paleontological resources at this alternative site and the GSEP site is similar. As stated in the **Geology, Paleontology, and Minerals** section, construction of the proposed project will include mass grading, deep foundation excavation, and utility trenching. There exists the probability of encountering paleontological resources. As with the proposed project site, the proposed conditions of certification are designed to mitigate any paleontological resource impacts to a less-than-significant level.

Comparison to Proposed Project The Gabrych Alternative site is subject to a similar risk of geologic hazards as the proposed project site. Although not expected, strong ground shaking could be effectively mitigated through facility design. The potential to encounter geologic resources and significant paleontological resources at the alternative site is similar to the GSEP site. The conditions of certification provided in the **Geology, Paleontology and Minerals** section would be applicable to the Gabrych Alternative site.

Power Plant Efficiency

The plant configuration and solar trough technology that would be employed at the Gabrych Alternative site would be similar to the proposed project, which means it would result in similar consumption of fuel, and it would result in a similar level of efficiency.

Power Plant Reliability

The plant configuration at the Gabrych Alternative site would be similar to the proposed project, which means it would result in similar levels of equipment availability. Plant maintainability, fuel and water availability, and reliability of the plant in relation to natural hazards would each be similar at this alternative site to the proposed project.

Transmission System Engineering

Locating a solar facility at the Gabrych Alternative site would require a shorter connector line than at the proposed site. Once collected, the power would interconnect with the proposed Colorado River Substation. As such, the transmission system evaluation for the Gabrych Alternative site would be similar to that of the proposed GSEP.

Summary of Impacts – Gabrych Alternative

The Gabrych Alternative site would have impacts similar to the proposed GSEP site for 10 of the 20 environmental and engineering resource elements discussed above: air quality, public health, socioeconomics, traffic and transportation, waste management, facility design, geology, paleontology and minerals, power plant efficiency, power plant reliability, and transmission system engineering.

The proposed GSEP site is preferred over the Gabrych Alternative site in five resource elements: hazardous materials, land use, noise, visual resources, and transmission line safety and nuisance.

The Gabrych Alternative site is preferred over the proposed GSEP site for six resource elements: recreation and wilderness, soils and water, worker safety and fire protection, biology, and cultural resources. Impacts to biological and cultural resources are anticipated to be reduced at the Gabrych Alternative site compared to at the GSEP site because the Gabrych Alternative site would be located on disturbed land. This would lessen the amount of sensitive species habitat that would be lost due to the construction of the project and would potentially lessen impacts to cultural resources. However, without having completed detailed site surveys of biological and cultural resources at the Gabrych Alternative site, a detailed comparison is not possible.

The alternative is potentially feasible and would reduce impacts in comparison with the proposed project. However, due to the number of parcels that would have to be acquired, obtaining site control may be more challenging at this site. In addition, detailed site engineering and transmission interconnection would require additional time for this site to be developed; as a result this alternative would not meet the project objective requiring that a decision to be made in 2010.

B.2.8 ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN FURTHER DETAIL

B.2.8.1 SITE ALTERNATIVES

This section considers potential alternatives to the proposed GSEP that were evaluated, and determined to not be feasible or result in lesser impacts than the proposed action. Because these alternatives would not avoid or substantially reduce the adverse impacts of the proposed GSEP or because they do not meet project objectives, the purpose and need for the project, or are otherwise not reasonable alternatives, they are not analyzed in further detail in this RSA. The following alternative sites were evaluated in this analysis:

- McCoy Alternative
- Desert Center 1 Alternative
- Mule Mountain Alternative
- Black Hill Alternative
- Private Land Alternative
- Western ROW Alternative
- Reclaimed Water Alternative

McCoy Alternative

The McCoy Alternative was identified by NextEra in the AFC as a potential alternative site for the proposed project. The McCoy Alternative is located on BLM-administered land at T5S R21E Section 28. It is located northwest of Blythe, Riverside County (see **Alternatives Figure 4)** and is west of a CDCA utility corridor. The elevation of McCoy Alternative is between approximately 500 and 600 feet above sea level. The alternative identifies approximately 7,750 acres; however, it is assumed that approximately 1,800 acres of land would be required for the alternative.

McCoy was not pursued by NextEra as a possible site for the proposed project because it is being considered for a future solar project by NextEra.

Environmental Assessment. As with the proposed GSEP solar site, the McCoy Alternative site would require use of approximately 1,800 acres of land and would result in the permanent loss of approximately 1,800 acres of desert habitat. The project would require grading of approximately 1,800 acres and it is expected that because of the extensive grading, the alternative site would result in impacts to biological and cultural resources. The project site is adjacent to Nelson Bighorn Sheep Wildlife Habitat Management Area.

Both the proposed GSEP site and McCoy site would have a large footprint and require extensive grading, potentially resulting in erosion and runoff. The McCoy site is crossed by three large desert washes, potentially increasing the sediment flow in and around the site. Given the size of the power plants and the approximately 30-ft tall solar trough structures, visual impacts would be considerable. However, few sensitive receptors would be located adjacent to the McCoy site. The McCoy site would cross a designated open route (NECO Plan) and would potentially create impact to recreational uses of the route.

Rationale for Elimination. The McCoy site is located on undisturbed public land. This alternative would not reduce impacts of the proposed GSEP without creating severe impacts of its own. Therefore, the McCoy Alternative was eliminated from further consideration in this RSA.

Additionally, under its existing regulations, BLM determines if competing applications exist for the same facility or system. Applications that are first in time are given priority in consideration and are not considered competing applications with those filed later in time. Therefore, an alternative site on BLM-administered land with a pending application for another project is not considered a reasonable alternative to the proposed project for purposes of alternatives analysis. Therefore, an alternative site on BLM-administered land with a pending application, such as the McCoy Alternative, would not be a reasonable alternative for the proposed GSEP project unless that other application is rejected or withdrawn.

Desert Center 1 Alternative

The Desert Center 1 Alternative was identified by NextEra in the AFC as a potential alternative site for the proposed project. The Desert Center 1 Alternative is located on BLM-administered land north of Desert Center, adjacent to Highway 177, in Riverside County (see **Alternatives Figure 4)**. The elevation of Desert Center 1 Alternative is between approximately 500 and 700 feet above sea level. The site is located east of Joshua Tree National Park. Joshua Tree National Park is nearly 800,000 acres large and is used for hiking, mountain biking, rock climbing, and includes nine campgrounds. In 2007, NextEra applied for a right-of-way grant for the Desert Center 1 Alternative but after additional examination including environmental concerns, road access, conflicting uses, and transmission option, the application was withdrawn (GSEP 2009a). Most recently, the Solel project (CACA 49494) was proposed at this location (BLM 2009).

Rationale for Elimination The Desert Center 1 Alternative was not found to be a reasonable alternative for the proposed project. In August of 2008, the BLM indicated that the Desert Center 1 region was in an area that would potentially be subsumed in expansions of the Joshua Tree National Park and/or the McCoy Wilderness (AECOM 2010a). The BLM rejected the Solel application for this location in October of 2009 due to lack of due diligence.

Mule Mountain Alternative

The Mule Mountain Alternative was identified by NextEra in the AFC as a potential alternative site for the proposed project. The Mule Mountain Alternative is located on federal land administered by the BLM, and is located west of the town of Blythe, south of the I-10 in eastern Riverside County; see **Alternatives Figure 4**. The elevation of Mule Mountain Alternative is approximately 500 feet above sea level. The site would be located on 6,950 acres, at T7S R20E, Section 12. In 2007, NextEra applied for a right-of-way grant for the Mule Mountain Alternative but after additional examination including environmental concerns, road access, conflicting uses, and transmission option, the application was withdrawn (GSEP 2009a). The Bullfrog Green Energy Mule Mountain solar project is proposed at this location (BLM 2009b).

Environmental Assessment. As with the proposed GSEP site, the Mule Mountain Alternative site would require use of approximately 1,800 acres of land and would result in the permanent loss of approximately 1,800 acres of desert habitat. The project would require grading of approximately 1,800 acres and it is expected that because of the extensive grading, the alternative site would result in impacts to biological and cultural resources. According to CNDDB records, the site would support Desert Tortoise, Harwood's Milk Vetch, Cave Myotis, and California leaf-nosed bat (GSEP, 2009f).

Both the proposed GSEP site and Mule Mountain site would have a large footprint and require extensive grading, potentially resulting in erosion and runoff. The Mule Moutnain site is crossed by two large desert washes, potentially increasing the sediment flow in and around the site. Given the size required for solar power plants and the approximately 30-ft tall solar trough structures, visual impacts would be considerable and similar to those at the proposed GSEP solar site. The Mule Mountain site would be visible from the Mule Mountains ACEC to the east.

Rationale for Elimination. The Mule Mountain site is located on undisturbed public land. This alternative would not reduce impacts of the proposed GSEP without creating severe impacts of its own. Therefore, the Mule Mountain Alternative was eliminated from further consideration in this RSA.

Additionally, under its existing regulations, BLM determines if competing applications exist for the same facility or system. Applications that are first in time are given priority in consideration and are not considered competing applications with those filed later in time. Therefore, an alternative site on BLM-administered land with a pending application for another project is not considered a reasonable alternative to the proposed project for purposes of alternatives analysis. Therefore, an alternative site on BLM-administered land with a pending application, such as the Mule Mountain Alternative, would not be a reasonable alternative for the proposed GSEP project unless that other application is rejected or withdrawn.

Black Hill Alternative

The Black Hill Alternative was identified by NextEra in the AFC as a potential alternative site for the proposed project. The Black Hill Alternative is located on BLM-administered land north of Blythe, in Riverside County; see **Alternatives Figure 4**. The elevation of the Black Hill Alternative is between approximately 600 to 700 feet above sea level. NextEra stated that the total acreage for the Black Hill Alternative is 8,720 acres (GSEP 2009f). In 2007, NextEra applied for a right-of-way grant for the Black Hill Alternative but after additional examination including environmental concerns, road access, conflicting uses, and transmission option, the application was withdrawn (GSEP 2009a). Most recently the OTB Power Holdings, Inc. project (CACA 049098) was proposed at this site and denied by the BLM (BLM 2009b).

Environmental Assessment. As with the proposed GSEP site, the Black Hill Alternative would require use of approximately 1,800 acres and would result in the permanent loss of desert habitat. The project would require grading of approximately 1,800 acres and it is expected that due to the extensive grading requirement, building the GSEP at the alternative site would likely result in impacts to biological and cultural resources.

Impacts to land use and recreation at the Black Hill Alternative would potentially be significant as it is located adjacent to the Big Maria Mountains Wilderness and is crossed by three designated open routes (NECO Plan). Because it is immediately north of several rural residences, impacts to public health, noise and visual resources would potentially be worse than at the proposed site.

Both the proposed GSEP site and Black Hill Alternative site would have a large footprint and require extensive grading, potentially resulting in erosion and runoff. The Black Hill Alternative site is crossed by ephemeral waters and washes that would likely be rerouted. As stated above, Black Hills Alternative site is north of several residences and would likely be visible from these residences. Given the size required for solar power plants and the approximately 30-ft tall solar trough structures, visual impacts would be considerable and similar to those at the proposed GSEP site.

Rationale for Elimination. The Black Hills Alternative would not reduce impacts of the proposed GSEP without creating significant impacts of its own. Therefore, the Black Hills Alternative was eliminated from further consideration in this RSA.

Additionally, in the fall of 2008, the BLM rejected the OTB Power Holdings, Inc. application for a right-of-way grant at the Black Hills Alternative site (BLM 2009b). This application was rejected for lack of due diligence.

Private Land Alternative

Two private landholdings were considered by NextEra in addition to the Gabrych private land addressed above. However, after additional research the applicant determined that any water use in the Blythe area -- where the alternative sites are located -- might impact the Colorado River water basin (GSEP 2009f). As such, the private lands were eliminated from consideration by the applicant (GSEP 2009f). Because dry cooling is a

feasible technology that could be used with any alternative site, private land alternatives near the Blythe area were not immediately eliminated for purposes of the RSA.

The additional private sites considered by the applicant, the Farmland Reserve site and the Sunworld site, would also be located on private, disturbed land, and would include portions of land that were previously used for agriculture but that are no longer actively farmed. However, the portions of the Farmland Reserve and Sunworld sites that are no longer actively farmed have been considered as a potential alternative to the Blythe Solar Power Project [09-AFC-6] (CEC 2010a). Additional inactive agriculture land is located near Desert Center and is analyzed as the North of Desert Center Alternative for the Palen Solar Power Project RSA [09-AFC-7] (CEC 2010b).

Staff did not retain the Farmland Reserve and Sunworld sites for full analysis because the Gabrych Alternative is considered to be an adequate private land alternative. However, it should be recognized that more than 1,800 acres of inactive agriculture land are located northwest of Blythe and have been analyzed in the Blythe Solar Power Project RSA as the Blythe Mesa Alternative.

Western Right of Way Alternative

The Genesis ROW application is for a total of 4,640 acres. The GSEP, as proposed, would occupy 1,800 acres within the eastern portion of the ROW application. The remaining 2,840 acres are not occupied by the project. Because of concern regarding impacts to sand transport by wind from the two aeolian corridors (west along the Chuckwalla Valley parallel with I-10 and south down the Palen-McCoy valley), and water-based sand transport down the multiple alluvial fan channels that the site intersects, incorporating a portion of the western ROW to accommodate one unit of the Genesis project was considered. The western portion of the ROW would not accommodate a 125 MW solar field as configured for the proposed GSEP. However, the western portion of the ROW occupies sufficient acreage for revised configuration a 125 MW solar field. Use of the western ROW would require longer linear infrastructure.

After further study of both the Palen-McCoy Valley aeolian sand corridor and the Chuckwalla Valley sand transport, staff concluded that the proposed GSEP footprint was less of a concern from an aeolian perspective. The proposed footprint avoids most of the Chuckwalla sand corridor and most of the dominant aeolian sand migration in the Palen-McCoy corridor. A sand transport report is included as the **Soils and Water Section Appendix A.**

Moreover, after evaluating use of the western ROW, staff identified additional concerns. A reconfigured solar field in the western ROW would increase the linear footprint of the project and potentially cause greater impacts to the alluvial fan drainage plan. A more linear footprint would require collecting additional channels into an interceptor drain and concentrating the flow and releasing it downstream. Staff also has concerns regarding the western ROW's proximity to the Palen Dry Lake ACEC and the potential to impact significant sensitive cultural resources. Because use of the western ROW did not reduce impacts as originally believed and would have the potential to introduce additional impacts, staff did not evaluate it in greater detail.

Reclaimed Water Alternative

The applicant considered a variety of reclaimed water sources as alternatives to the proposed on-site groundwater wells. These include (GSEP 2009f):

- City of Blythe Water Production and Treatment Facility, Reclaimed Water (approximately 400 acre feet);
- Chuckwalla State Prison, Wastewater (approximately 600 acre feet);
- Colorado River Sewage System Joint Venture, Westates, near Parker AZ (N/A); and
- Metropolitan Water District of Southern California, Desert Center Plant Wastewater (approximately 10-20 acre feet).

Additional water sources were identified in Section 3.0 Facility Description of the AFC, but these sources, such as Colorado River water, are not reclaimed water. None of the reclaimed water sources identified by the applicant would have sufficient reclaimed water supply as to make a viable alternative water supply.

Additionally, directly using reclaimed water would not change the overall water balance for the groundwater basin. Reclaimed water is already accounted for as recharge to the groundwater system. An upgraded treatment, including a pump station and pipeline may actually lessen the amount of water in the overall water balance due to increased losses in the treatment and transport. Evaporation losses would likely increase with additional treatment as well. As such, this alternative was not evaluated in further detail.

B.2.8.2 ALTERNATIVE SOLAR GENERATION TECHNOLOGIES

In addition to the range of alternative sites discussed earlier, several alternative solar generation technologies were evaluated as potential alternatives to the proposed GSEP (which would use the solar trough technology). Although alternative solar generation technologies would achieve most of the project objectives, each would have different environmental or feasibility concerns. The following solar generation technologies are considered in this analysis:

- Stirling energy systems technology
- solar power tower technology
- linear Fresnel technology
- photovoltaic technology

Among the solar thermal technology alternatives, the linear Fresnel alternative has the potential for least impacts due to its more compact configuration (reducing ground disturbance); however, the technology is proprietary and is not available to other developers. The distributed solar alternative would have fewer impacts than the proposed project because it would be located on already existing buildings or on already disturbed land. However, achieving 250 MW of distributed solar PV or solar thermal would depend on additional policy support, manufacturing capacity, and lower cost than currently exists to provide the renewable energy required to meet the California Renewable Portfolio Standard requirements. Additional technologies, like utility-scale solar thermal generation, are also necessary.

The following analyses assumed that the alternative technologies would be implemented on the site for the proposed GSEP, in eastern Riverside County.

Alternatives Table 3. Summary Characteristics of Solar Technologies

Technology	Parabolic trough	Solar Power Tower	Stirling Engine	Linear Fresnel	Photovoltaic
Water Use/ 100 MW (Assumes dry cooling)	~65 AFY	~20 AFY	~5 AFY	~12 AFY	~2-10 AFY
Acres per MW	6-7	10	9	4	8-12
Low Impact Construction Possible	No	Yes	Yes	No	Yes
Tallest component (does not include cooling towers or Transmission Line)	25 feet – trough	300 - 650 feel	38 feet - engine	56 feet	10 -15 feet (+ inverter station)
Slope requirements	2% or less	5% or less, can use LID	6% or less, can use LID	1% or less	3% or less, can use LID
Siting restrictions	Troughs are 1300 feet long, requires contiguous land	Heliostats must be in concentric circles around power tower	Can be sited in irregular shapes	Requires rectangles, requires contiguous land	Can be sited in irregular shapes
Heat Transfer Fluid (do not include water)	Yes	No	No	No (water used)	No

Stirling Dish Technology

The Stirling dish technology converts thermal energy to electricity by using a mirror array to concentrate and focus sunlight on the receiver end of a Stirling engine. The curved dishes that focus the sun's energy are approximately 45 feet tall and occupy a maximum horizontal space of approximately 1,135 square feet (0.026 acres), with an anchored footprint of 12.5 square feet (assumed 4-foot diameter caisson). See **Alternatives Figure 5** for an illustration. The internal side of the receiver heats hydrogen gas, which expands. The pressure created by the expanding gas drives a piston, crankshaft, and drive shaft. The drive shaft turns a small electricity generator. The entire energy conversion process takes place within a canister the size of an oil barrel. The generation process requires no water, and the engine does not produce emissions as no combustion takes place. Each concentrator consists of one Stirling engine mounted above one mirror array.

In general, the Stirling system requires 7 to 9 acres of land per MW of power generated. Based on literature search, a 250 MW Stirling engine field would require from 1,750 acres to 2,250 acres of land. The two proposed solar thermal power plants using Stirling engine technology currently being considered by BLM and the Energy Commission, SES Solar 1 and 2, have a land use per MW of installed capacity of approximately 8.3 acres per MW, and would require a greater footprint than the GSEP.

Site preparation involves sinking a cement base with an embedded pedestal to support the dish (SES 2008). Each Stirling dish generates 25 kilowatts (KW) of power, so 10,000 dishes would be required to generate 250 MW. Each dish includes two major elements:

- **Solar Concentrator.** Large parabolic concentrators include 89 mirror facets attached to a frame by three point adjusting mounts (SES 2008). They are designed in five subassembly units for ease of transport and installation on site. Two small motors are attached to the pedestal and programmed to swivel the dish on two axes, following the sun's progress across the sky during the day.
- **Power Conversion Unit.** The Stirling engine's cylinder block incorporates four sealed cylinder assemblies along with coolers, regenerators, and heater heads (SES 2008). Concentrated solar energy heats up self-contained gas (hydrogen) in the power conversion unit, causing the gas to expand into the cylinders, moving the cylinders, and generating electricity. This cycle is repeated over and over as the engine runs at a steady rate of 1,800 rpm (SES 2008). Power is generated by heat transfer from the concentrated solar rays to the working gas in the engine's heater head, which converts the heat energy into mechanical motion.

The generator of each unit in a utility-scale project is connected by underground transmission line to a small substation where the power can be transformed into a higher voltage for more efficient transmission across the grid.

Environmental Assessment. The land area required for a 250 MW Stirling engine power plant is greater than that required for the proposed GSEP. However, it is not necessary to grade the entire parcel as only the 18-inch diameter pedestal of the Stirling engine requires level ground. It would still be necessary to grade permanent access roads between every two rows of Stirling engines due to the need for regular washing of the mirrors. This grading would cause removal of vegetation. Additionally, because the proposed GSEP site is crossed by several desert washes, the installation of 10,000 Stirling engines could require a larger total acreage of land, resulting in a greater loss of habitat.

Stirling engines systems require minimal water use during operations. The SES Solar Two, a 750 MW project using the SunCatcher technology, would require approximately 32.7 acre feet per year. This technology would require less water than the proposed solar trough technology.

Due to the size and height of the Stirling mirrors, impacts to visual resources would be similar or greater to those of the GSEP. The 10,000 Stirling engines would introduce an industrial character and transformation of the site with the 45 foot tall engines. There would be less grading for the Stirling engine structures, but the numerous access roads required for cleaning the energy systems would create a high contrast between the disturbed area and its surroundings. The project would still require use of I-10 for commuting workers during both construction and operation.

Summary of Impacts. The large area needed for a Stirling engine power plant would be greater than the land requirement for the GSEP. Although grading requirements for the Stirling engines and solar concentrators are relatively small, grading for access

roads would be extensive because access roads are required for every other row of Stirling engines (SES 2008). For these reasons, recreation and land use, and biological resources impacts would be similar to those of the GSEP facility. In addition, due to the extent of the facility and the height of each concentrator, visual impacts would not be significantly reduced by this alternative and may be greater considering that the 45-foot high solar concentrators would be more pronounced than the approximately 30-foot high solar troughs. However, the Stirling technology does not require a turbine and would use less water than the GSEP.

Rationale for Elimination

Stirling engine systems are a viable renewable technology but would potentially increase the footprint of the project between 10 and 45 percent. Additionally, due to its greater height, it would potentially increase visual impacts. With a minimum size of nearly 1,750 acres, Stirling engine technology would not eliminate any of the significant impacts of the GSEP plant. Therefore, this alternative technology was eliminated from further consideration in this RSA.

Solar Power Tower Technology

The solar power tower technology converts thermal energy to electricity by using heliostat (mirror) fields to focus energy on a boiler located on power tower receivers near the center of each heliostat array. Each mirror tracks the sun during the day. The heliostats would be 7.2 feet high by 10.5 feet wide. See **Alternatives Figure 6** for an illustration. The solar power towers can be up to 600 feet tall with additional 10-foot tall lightning rods. The solar power tower would receive heat from the heliostats then convert the heat into steam by heating water in the solar boilers. A secondary phase would convert the steam into electricity using Rankine-cycle reheat steam turbine electric generator housed in a power block facility at each of the plants.

In general, a solar power tower power plant requires 5 to 10 acres of land per MW of power generated. A 250 MW solar power tower field would require from 1,250 acres to 2,500 acres of land. The proposed solar power tower plant currently being considered by BLM and the Energy Commission, Ivanpah Solar Electric Generating System, is using approximately 10 acres per MW, and would require a greater footprint than the GSEP.

Site preparation involves grading at the base of the heliostat and grading the access roads required for maintenance. Each heliostat field has the following primary components.

- **Heliostats.** The heliostat mirrors are arranged around each solar receiver boiler. Each mirror tracks the sun throughout the day and reflects the solar energy to the receiver boiler. The heliostats are approximately 7.2 feet high by 10.5 feet wide. They are arranged in arcs around the solar boiler towers asymmetrically.
- **Power Tower.** Tower structure height is up to 600 feet. Primary thermal input is via solar receiver boilers, superheater and reheaters at the top of the distributed power towers.

- **Steam Turbine Generator**. The steam turbine system consists of a condensing steam turbine generator with reheat, gland steam system, lubricating oil system, hydraulic control system, and steam admission/induction valving.

Power will be generated by the STGs at 19 kV (hydrogen cooled) and then stepped up by transformers for more efficient transmission across the grid.

Environmental Assessment

The land area required for a 250 MW solar power tower plant is likely greater to that required for the proposed GSEP. Grading of permanent access roads would be required due to the need for regular washing of the mirrors. This grading would cause removal of vegetation. Additionally, because the proposed GSEP site is crossed by several desert washes, the installation of the heliostats and power towers could require a larger total acreage of land, resulting in a greater loss of habitat.

Due to the size and height of the solar power towers, up to 600 feet, and mirrors, impacts to visual resources would be greater than those of the GSEP and would introduce an industrial character to this site and the surrounding areas.

Because of the height of the solar power towers and the direction that the sun is reflected by the heliostats, there may be concerns regarding any nearby aviation operations or military operations. Power tower technology would need to be reviewed for consistency with the Compatibility Plan adopted by the Riverside County Airport Land Use Commission. Policy 4.3.7 of the Countywide Policies of the 2004 Riverside County Airport Land Use Compatibility Plan includes guidance on characteristics to be avoided including glare or distracting lights which could be mistaken for airport lights. The Compatibility Plan also prohibits any use which would cause sunlight to be reflected toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at the airport.

Rationale for Elimination

The large area needed for a solar power tower plant would be greater than the land requirement for the GSEP. Grading requirements for the solar power tower would be less than for the GSEP because the solar power tower technology does not require grading of the entire solar field; however, grading would still be required for the access roads in between the rows of heliostats. For these reasons, recreation and land use, biological resources, and cultural resource impacts would be similar to those of the GSEP. In addition, due to the extent of the facility and the height of the power towers, impacts to the Desert Center Airport would potentially be greater for this alternative.

Because no substantial reduction in impacts would occur under this alternative technology, the solar power tower technology was eliminated from further consideration in this RSA as an alternative technology.

Linear Fresnel Technology

A solar linear Fresnel power plant converts solar radiation to electricity by using flat moving mirrors to follow the path of the sun and reflect its heat on the fixed pipe receivers located about the mirrors. During daylight hours, the solar concentrators focus

heat on the receivers to produce steam, which is collected in a piping system and delivered to steam drums located in a solar field and then transferred to steam drums in a power block (Carrizo 2007). The steam drums transferred to the power block will be used to turn steam turbine generators and produce electricity. The steam is then cooled, condensed into water, and recirculated back into the process.

In general, the linear Fresnel technology requires 4 to 5 acres of land per MW of power generated. A 250 MW solar linear Fresnel field would require approximately 1,000 – 1,250 acres of land.

Each row-segment is supported by large hoops that rotate independently on metal castors. Rotation of the reflectors would be driven by a small electrical pulse motor. Reflectors are stowed with the mirror aimed down at the ground during the night. The major components are:

- **Compact Linear Fresnel Reflector (CLFR) Solar Concentrator.** A solar Fresnel power plant would use Ausra's CLFR technology which consists of slightly curved linear solar reflectors that concentrate solar energy on an elevated receiver structure. Reflectors measure 52.5 by 7.5 feet (Carrizo 2007). There are 24 reflectors in each row. A line is made up of 10 adjacent rows and operates as a unit, focusing on a single receiver (Carrizo 2007).
- **Receiver Structure.** The receiver structure is approximately 56 feet tall (Carrizo 2007). It would carry a row of specially coated steel pipes in an insulated cavity. The receiver would produce saturated steam at approximately 518°F from cool water pumped through the receiver pipes and heated (Carrizo 2007). The steam would drive turbines and produce electricity.

Rationale for Elimination

The Fresnel solar technology is a proprietary technology owned by Ausra, Inc. However, Ausra, Inc. has changed its focus to being a technology and equipment provider rather than an independent power developer and owner, Ausra will focus on medium-sized (50 MW) solar steam generating systems for customers including steam users, such as food processors, enhanced oil recovery firms, and utilities for power augmentation systems that deliver steam into existing fossil-fuel power plants. A project of 250 MW is theoretically possible, and would require smaller acreage per megawatt. However, at nearly 1,250 acres for 250 MW, this technology would not eliminate the significant impacts of the proposed solar trough technology at this site.

Solar Photovoltaic Technology – Utility Scale

A utility scale solar photovoltaic (PV) power generation facility would consist of PV panels that would absorb solar radiation and convert it directly to electricity. The definition of a utility scale photovoltaic projects varies; for this analysis utility scale project would consist of any solar photovoltaic facilities that would require transmission to reach the load center, or center of use.

PV facilities have been suggested using two general technologies:

- Thin film installed on fixed metal racks, as proposed by First Solar (see **Alternatives Figure 7**)

- Concentrating photovoltaics installed in elevated groups of panels that track the sun. These technologies are available from companies such as SunPower and Amonix. SunPower's PowerTracker technology consists of a single-axis mechanism that rotates the PV panels to follow the sunlight. The Amonix technology allows tracking on two axes. See **Alternatives Figure 7**.

Examples of existing utility scale PV facilities are:

- El Dorado Energy (Boulder City, NV): First Solar built a 10 MW facility using thin film technology for Sempra Energy demonstrating the commercial viability of its technology. The facility consists of over 167,000 solar modules on 80 acres of land and was completed in December 2008. (Sempra 2008). Additionally, Sempra Generation will begin expanding the facility by 48 MW in January 2010. All 58 MWs would be purchased by PG&E (Sempra 2009).
- NRG Solar (Blythe, CA): NRG Solar acquired a 21 MW thin film PV project in Blythe, CA. Commercial operation of the facility began in December 2009 and the electricity generated by the project is being sold to SCE under a 20 year power purchase agreement (NRG 2009).

Because PV technologies vary, the acreage required per MW of electricity produced from a large solar PV power plant is wide ranging and likely to change as technology continues to develop. The land requirement varies from approximately 3 acres per MW of capacity for crystalline silicon to more than 10 acres per MW produced for thin film and tracking technologies (NRDC 2008c). Therefore, a nominal 250 MW solar PV power plant would require between 750 and 2,500 acres.

Utility-scale solar PV installations require land with less than 3 percent slope. Solar photovoltaics do not require water for electricity generation. Because some water will be required to wash the solar panels to maintain efficiency, approximately 2-10 AFY of water is estimated to be required for a 100 MW utility solar PV installation or 10 to 50 AFY for a 250 MW installation (NRDC 2008c). The SunPower-CA Valley Solar Ranch states that the facility would use approximately 11.6 AFY for a 250 MW PV facility (SLO 2009).

Solar PV arrays and inverters would be approximately 15 to 20 feet high; however, some components of the solar PV facility, such as collector power lines or a transmission interconnection may be substantially taller (SLO 2009).

As with any large solar facility, additional operational components may be required. The SunPower-California Valley Solar Ranch would require operational components such as electrical equipment, collector power lines, access roads, a substation, an operation and maintenance building, and water tanks (SLO 2009).

Environmental Assessment. A utility scale solar PV facility would create a number of substantial adverse effects similar to those created by the proposed GSEP facility. If utility scale solar PV technology were built at the GSEP site, approximately 750 to 2,500 acres may be required, depending on the technology. The types of impacts from developing a solar PV project at the GSEP site are discussed below.

Development and installation of solar PV at the proposed project site could have adverse impacts to vegetation and wildlife from construction of access roads, transmission lines and any needed ancillary facilities (e.g., substation, water tank and a maintenance building). PV technologies require level ground of less than 3 percent slope; however, as the criteria for the GSEP site was a slope of 3 percent or less, it is expected that less grading would be required to site the PV arrays. Construction of a PV project would cause both temporary (during construction from vegetation clearing) and permanent (displacement of vegetation with project features) impacts to vegetation and wildlife habitat. Construction activities may also result in the alteration of soil conditions, including the loss of native seed banks and changes in topography and drainage, such that the ability of a site to support native vegetation after construction is impaired. Desert ecosystems are especially sensitive to ground disturbance and can take decades to recover, if at all. PV facilities could require security fencing; however some projects have proposed fencing that leaves 12 inch spacing from the ground to allow wildlife to enter into the solar array areas to aid in wildlife movement (SLO 2009).

Solar PV facilities would potentially require more land to generate 250 MW than the proposed parabolic trough technology for the GSEP. The amount of ground disturbance for a solar PV facility varies and depends on the PV technology used; however, in order to avoid sensitive resources it is expected that greater amounts of land would be required than with the parabolic trough technology. For example, the California Valley 250 MW solar PV project is proposed on a 4,365 acre site, although only a portion of that would be covered with solar PV arrays (SLO 2009).

The construction activities associated with solar PV development at the GSEP site have the potential to adversely impact surface water quality. During grading and construction activities there is the potential for surface water runoff to carry pollutants and sediment offsite and degrade water quality in nearby waters. Common pollutants that could be introduced into storm water during construction include, but are not limited to, fertilizers from landscape management, petroleum hydrocarbons and heavy metals from construction vehicles. Accelerated wind and water-induced erosion may result from construction. Precipitation, or high intensity and short duration runoff events coupled with ground disturbing activities, can result in onsite erosion eventually increasing the sediment load into nearby waters. Soils devoid of vegetation have a high potential for erosion, particularly when disturbed.

Because the solar PV technology does not require any water for cooling or steam generation, the technology uses less water during operations than solar concentrating technologies. For certain PV technologies, water is required only for washing the solar PV arrays. Solargen's 420 MW Panoche Valley Solar Farm (2009) would use 10.5 AFY during operation. First Solar's 550 MW Desert Sunlight Solar Farm (thin film) operation water estimates are for domestic purposes (drinking, washing, and toilets) and would be no more than a few hundred gallons per day. However, during construction an estimated 1,800 AFY would be required for soil compaction, dust control and sanitary needs (First Solar 2010).

Summary of Impacts. The large land area required for PV development would result in similar impacts to recreation, land use, biological and cultural resources, and soil and water resources as to those of the GSEP facility. However, a utility scale PV project

would reduce impacts to glare and would require minimal water for washing of the PV panels and would require no water use for cooling.

Rationale for Elimination

Utility scale solar PV technology is a viable renewable technology, but it is not retained for analysis because, as stated above, in order for California to meet the renewable portfolio standards, it must have access to all types of renewable technologies. In addition, use of utility scale solar PV would not reduce major biological resources impacts of the GSEP facility because the extent of land and access roads required would be similar. Therefore, solar PV technology would not eliminate the impacts of the GSEP associated with ground disturbance. While a utility solar PV alternative would reduce impact from water used during cooling, the Dry Cooling Alternative, retained for consideration for this project would also eliminate this impact. Therefore, this alternative technology was eliminated from further consideration in this RSA.

Distributed Solar Technology

There is no single accepted definition of distributed solar technology. The *2009 Integrated Energy Policy Report* (IEPR) defines distributed generation resources as "grid-connected or stand-alone electrical generation or storage systems, connected to the distribution level of the transmission and distribution grid, and located at or very near the location where the energy is used."

Distributed solar facilities vary in size from kilowatts to tens of megawatts but do not require transmission to get to the areas in which the generation is used. Distributed solar generation is generally considered to use photovoltaic (PV) technology although at slightly larger scales it is also being implemented using solar thermal technologies. Both technologies are considered below.

Distributed Solar PV Systems

A distributed solar alternative would consist of PV panels that would absorb solar radiation and convert it directly to electricity. The PV panels could be installed on residential, commercial, or industrial building rooftops or in other disturbed areas such as parking lots or disturbed areas adjacent to existing structures such as substations. To be a viable alternative to the proposed GSEP, there would have to be sufficient newly-installed panels to generate 250 MW of capacity.

California currently has over 540 MW of distributed solar PV systems which cover over 40 million square feet (CPUC 2009). During 2008, 158 MW of distributed solar PV was installed in California, doubling the amount installed in 2007 (78 MW), and with 78 MW installed through May 2009, installation data suggests that at least the same amount of MW could be installed in 2009 as in 2008 (CPUC 2009).

Rooftop PV systems and parking lot systems exist in small areas throughout California. Larger distributed solar PV installations are becoming more common. Examples of the different distributed PV systems are:

- Nellis Air Force Base (AFB, Nevada): Over 72,000 solar panels, generating 14 MW of energy, were constructed in 2007, by SunPower Corp. on 140 acres of Nellis AFB land (Whitney 2007). Energy generated is used at the Nellis AFB.

- Southern California Edison (Fontana, CA): SCE has installed over 3 MW of distributed solar energy in two phases on over 1 million square-foot commercial roof using thin film PV technology provided by First Solar. This is the beginning of a planned installation of 3.5 million PV panels that would generate 250 MW of capacity (SCE 2009).
- San Diego Gas & Electric (San Diego, CA): SDG&E's Solar Energy Project is designed to install up to 25 to 30 MW of solar PV, which would include PV installation on parking structures and tracking systems on open land (SDG&E 2010).
- Pacific Gas & Electric (San Francisco, CA): PG&E launched a five-year program to develop 250 MW of solar PV power. The program would consist of 250 MW of utility-owned PV generation and an additional 250 MW to be built and operated by independent developers under a streamlined regulatory process. PG&E's program targets mid-sized projects, between 1 to 20 MWs, mounted on the ground or rooftops within its service area. It was approved by the CPUC in April 2010 (PG&E 2010).
- City of San Jose (San Jose, CA): The City of San Jose is considering the development and implementation of 50 MW of renewable solar energy on city facilities and/or land (San Jose 2009). San Jose's Green Vision lays out a goal of achieving 100 percent of the city's electricity from renewable energy by 2020 and plans to implement strategies, such as a 24-month period to increase solar installations in San Jose by 15 percent. The City anticipates that City facilities with appropriate solar access including parking lots, garages, lands and landfills would be eligible for solar installation. San Jose received ARRA funding for the project.

Like utility-scale PV systems, the acreage of rooftops or other infrastructure required per MW of electricity produced is wide ranging. As stated above, California has approximately 40 million square feet (approximately 920 acres) of distributed solar PV accounting for 441 MW installed (CPUC 2008b). However, based on SCE's use of 600,000-square-feet for 2 MW of energy, 75 million square feet (approximately 1,750 acres) would be required for 250 MW.

Riverside County is estimated to have the technical potential for over 3,000 MW of distributed solar PV (CEC, 2007b). However, distributed solar PV could be located throughout the State. The location of the distributed solar PV would impact the capacity factor of the distributed solar PV.[1] The capacity factor depends on a number of factors including the insolation[2] of the site. Because a distributed solar PV alternative would be located throughout the State, the insolation at some of these locations would be less than in the Mojave Desert. The Renewable Energy Transmission Initiative (RETI) assumed a capacity factor of approximately 30 percent for solar thermal technologies and tracking solar PV and approximately 20 percent capacity factor for rooftop solar PV which is assumed to be non-tracking, for viable solar generation project locations (B&V 2008; CEC 2009). Tracking distributed solar PV would have a higher capacity factor as well.

[1] The capacity factor of a power plant is a percentage that tells how much of a power plant's capacity is used over time (CEC 2008a)

[2] Insolation is the total amount of solar radiation striking a surface exposed to the sky (CEC 2008a).

Distributed Solar Thermal Systems

Solar thermal technology, specifically Concentrated Solar Power (CSP) technology, has also been adapted for use at distributed locations. In August 2009, eSolar began operations of a new distributed solar power tower technology. This technology uses small, flat mirrors which track the sun and reflect the heat to tower-mounted receivers that boil water to create superheated steam (eSolar 2009). An example of the eSolar system is the Sierra SunTower, located in Lancaster, CA, which produces 5 MW of energy for SCE on 20 acres of land (eSolar 2009). Each eSolar module locates one tower, one thermal receiver, and 12,000 mirrors on ten acres of land and produces 2.5 MW of power. Additionally, eSolar has developed a larger module, a 46 MW CSP plant that would include sixteen towers, a turbine generator set, and a steam condenser which would be located on approximately 160 acres (eSolar 2009).

The solar trough technology could also be used as distributed technology. Solar Millennium has stated that its technology could be used in conjunction with desalination plants and other industrialized activities and could be used in 20 MW blocks (Solar Millennium 2008).

Both the solar thermal technologies have been implemented recently and are described here as an example of the evolving distributed solar technologies.

Environmental Assessment

Installations of 250 MW distributed solar PV would require up to 75 million square feet. Distributed solar PV is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required and there would be few associated biological impacts.

Minimal grading or few new access roads would be required and relatively minimal maintenance and washing of the solar panels would be required. As such, it is unlikely that the rooftop solar PV alternative would create erosion impacts. Some water would be required to wash the solar panels, especially with larger commercial rooftop solar installations; however, the commercial facilities would likely already be equipped with drainage systems. Therefore, the wash water would not contribute to runoff or to erosion.

Because most PV panels are black to absorb sun, rather than mirrored to reflect it, glare would be lessened. Additionally, the distributed solar PV alternative would not require the additional operational components, such as dry-cooling towers, substations, transmission interconnection, maintenance and operation facilities with corresponding visual impacts. Solar PV panels would be visible to passing residents and may be viewed by a larger number of people.

Consideration of CEQA/NEPA Criteria

Reduction of Impacts. Distributed solar technology is assumed to be located on already existing structures or disturbed areas so little to no new ground disturbance would be required; there would be few associated impacts to biological and cultural resources. Additionally, impacts to soils and waters as well as visual resources would be reduced.

Meet Most Project Objectives. A distributed solar technology alternative, if constructed at 250 MW, would meet the CEC project objectives to operate 250 MW of renewable power in California capable of selling competitively priced renewable energy. The solar technology would not necessarily meet the objective to locate the facility in areas of high solarity, because the distributed technology could be located throughout the State.

Feasibility. The rate of PV manufacturing and installation is expected to continue to grow very quickly. However, given that there are currently only about 500 MW of distributed solar PV in California, the addition of an additional 250 MW to eliminate the need for the Genesis Solar Energy Project cannot be guaranteed. This would require an even more aggressive deployment of PV at more than double the historic rate of solar PV implementation than the California Solar Initiative program currently employs. Challenges to an accelerated implementation of distributed solar PV are discussed below.

- **RETI Consideration of Subsidies, Tariffs, Cost, and Manufacturing.** The RETI Discussion Draft Paper *California's Renewable Energy Goals – Assessing the Need for Additional Transmission Facilities* published with the RETI Final Phase 2A Report (September 2009), addresses the likelihood of a scenario of sufficient distributed solar PV to remove the need for utility scale renewable development. This discussion paper identified the factors likely to influence the pace of large scale deployment of distributed solar PV: subsidies, feed-in tariffs, manufacturing and installation cost, and manufacturing scale-up.
- **Cost.** The 2009 IEPR states that solar PV technology has shown dramatic cost reductions since 2007, and is expected to show the most improvement of all the technologies evaluated in the 2009 IEPR model, bringing its capital cost within range of that of natural gas-fired combined cycle units. However, the CPUC *33% Renewables Portfolio Standard Implementation Analysis Preliminary Results* considered a number of cases to achieve a 33 percent RPS standard. The results of this study state that the cost of a high distributed generation case is significantly higher than the other 33 percent RPS alternative cases. The study explains that this is due to the heavy reliance on solar PV resources which are more expensive than wind and central station solar.
- **Tariffs**. Additionally, the IEPR discusses the need to adjust feed-in tariffs to keep downward pressure on costs. Feed-in tariffs should be developed based on the size and type of renewable resources, given that the cost of generating energy from a 100-MW wind farm is less than the cost of generating to ensure a good mix of new renewable energy projects. According to the report, differentiating feed-in tariffs by type and size can ensure a good mix of new renewable energy projects and avoid paying too much for some technologies and too little for others.
- **Limited Installations**. Examples of large scale distributed solar projects are still limited. In the spring of 2008, SCE proposed 250 to 500 MW of rooftop solar PV to be installed in five years. As of January 2010, SCE had installed only 3 MW. As the 2009 IEPR points out, the potential for distributed resources remains largely untapped and integrating large amounts of distributed renewable generation on distribution systems throughout the State presents challenges.

- **Electric Distribution System**. The State's electric distribution systems are not designed to easily accommodate large quantities of randomly installed distributed generation resources at customer sites. Accomplishing this objective efficiently and cost-effectively will require the development of a new transparent distribution planning framework.

The 2009 IEPR makes a number of recommendations to support the integration of distributed generation into the California grid, expand feed-in tariffs, and support the efforts to achieve the RPS goals as a whole. It also recommends supporting new renewable facilities and the necessary transmission corridors and lines to access the facilities.

In testimony filed by the Center for Biological Diversity in the Ivanpah Solar Electric Generating System (ISEGS) proceeding [Docket No. 07-AFC-5], Bill Powers stated his disagreement with the conclusions of the ISEGS Alternatives FRSA section addressing distributed solar PV. Powers believed that the technology and manufacturing capacity is available to develop 400 MW of distributed PV, and that the distribution system would be able to accommodate the additional distributed generation. He presented numerous examples of California utility programs that have committed to development of hundreds of megawatts of additional distributed solar PV.

The conclusion of this section is that, while it will very likely be possible to achieve 250 MW of distributed solar energy over the coming years, the very limited number of existing facilities make it difficult to conclude with confidence that it will happen within the timeframe required for the GSEP. As a result, this technology is eliminated from detailed analysis in this RSA.

B.2.8.3 ALTERNATIVE RENEWABLE TECHNOLOGIES

Non-solar renewable generation technologies were considered as potential alternatives to the proposed project. The following renewable generation technologies were considered in this analysis:

- wind energy
- geothermal energy
- biomass energy
- tidal energy
- wave energy

The non-solar renewable technologies alternatives (wind, geothermal, biomass, tidal, wave) would either be infeasible at the scale of the GSEP, or would not eliminate significant impacts caused by the project without creating significant impacts in other locations. Specifically, wind and geothermal energy that would be viable at some locations in Riverside County could create significant impacts to biological, visual, cultural, and water and soils resources.

None of these non-solar renewable technologies would meet the BLM's purpose and need, which is to approve, modify, or deny the applicant's request for a right-of-way and

to help develop an reliable supply of renewable energy in California. These technologies would be too great a departure from the application to be considered a modification of the applicant's proposal.

Wind Energy

Wind carries kinetic energy that can be utilized to spin the blades of a wind turbine rotor and an electrical generator, which then feed alternating current (AC) into the utility grid. Most state-of-the-art wind turbines operating today convert 35 to 40 percent of the wind's kinetic energy into electricity. A single 1.5-MW turbine operating at a 40 percent capacity factor generates 2,100 MWh annually.

Wind turbines currently being manufactured have power ratings ranging from 250 watts to 5 MW, and units larger than 7 MW in capacity are now under development (AWEA 2008). The average capacity of wind turbines installed in the United States in 2007 was 1.65 MW (EERE 2008). The perception of wind as an emerging energy source reached a peak in the early 1980s, when wind turbine generators to convert wind power into electricity were being installed in California at a rate of nearly 2,000 per year. Progress slowed a few years later, however, as start-up tax subsidies disappeared and experience demonstrated some deficiencies in design. At the present time, technological progress again has caught up, contributing lower cost, greater reliability, and reason for genuine optimism for this renewable energy source in the future.

The technology is now well developed and can be used to generate significant amounts of power. There are now approximately 2,490 MW of wind being generated in California (AWEA 2008).

Wind Resources at the GSEP Site. Wind resources are not viable at the GSEP site (BLM 2005a). The nearest medium to high wind resources are located immediately north of the GSEP site in a BLM designated wilderness area (BLM 2005a). Development of a wind project in wilderness is not a viable alternative.

San Gorgonio Pass. The nearest viable wind resource area to the GSEP site is the San Gorgonio Pass, northwest of Palm Springs. This is considered one of the best regions in California for producing wind energy. However, there is little undeveloped land remaining for expansion beyond the already existing wind farms (WAPA 2003). Because there is minimal expansion room, the wind industry is instead replacing the older turbines in the region with newer ones, called "repowering" (WAPA 2003). At one time, there were more than 4,000 turbines in the Pass but wind farm operators have been replacing smaller, less efficient machines with larger, more modern turbines that need less maintenance and that can harness (WAPA 2003).

Environmental Assessment. Wind turbines can create environmental impacts, as summarized below (AWEA 2008):

- Wind energy requires between 5 and 17 acres per MW of energy created. As such a nominal 250 MW power plant would require between 1,250 and 4,250 acres. However, wind turbine "footprints" typically occupy only 5 percent of the total area.
- Erosion can be a concern in certain habitats such as the desert or mountain ridgelines. Standard engineering practices can be used to reduce erosion potential.

- Birds collide with wind turbines. Avian deaths, particularly raptors, are a significant concern depending on raptor use of the area.
- Wind energy can negatively impact birds and other wildlife by fragmenting habitat, both through installation and operation of wind turbines themselves and through the roads and power lines that are required.
- Bats collide with wind turbines. The extent of bat mortality depends on turbine placement and bat flight patterns.
- Visual impacts of wind turbines can be significant, and installation in scenic and high traffic areas can result in strong local opposition. Other impressions of wind turbines are that they are attractive and represent clean energy.

Summary of Impacts. Approximately 1,250 to 4,250 acres of land would be required for a 250 MW wind electricity power plant. While wind plants would not necessarily impact the same types of wildlife and vegetation as the GSEP plant, the significant acreage necessary for a 250 MW wind plant would still cause significant habitat loss in addition to potentially significant impacts from habitat fragmentation and bird and bat mortality. Wind turbines are often over 400 feet high for 2-MW turbines. As such, any wind energy project would be highly visible.

Rationale for Elimination

While wind electricity generation is a viable and important renewable technology in California, it would not reduce the large-scale ground disturbance and visual impacts associated with the GSEP. Therefore wind generation was eliminated from further consideration.

Geothermal Energy

Geothermal technologies use steam or high-temperature water obtained from naturally occurring geothermal reservoirs to drive steam turbine/generators. There are vapor dominated resources (dry, super-heated steam) and liquid-dominated resources where various techniques are used to extract energy from the high-temperature water.

Geothermal plants account for approximately 5 percent of California's power and range in size from under 1 MW to 200 MW. California is the largest geothermal power producer in the United States, with about 1,800 MW installed capacity; in 2007, 13,000 gigawatt hours of electricity were produced in California (CEC 2008). Geothermal plants provide highly reliable baseload power, with capacity factors from 90 to 98 percent.

Geothermal plants must be built near geothermal reservoir sites because steam and hot water cannot be transported long distances without substantial thermal energy loss. Geothermal power plants are currently operating in the following California counties: Lake, Sonoma, Imperial, Inyo, Mono, and Lassen. The RETI Phase 1A Report (2008) estimated an incremental capacity of approximately 2,400 MW for the entire State by 2018.

Geothermal Resources at the GSEP Site. There are no viable geothermal resources at the GSEP site. The nearest medium or high geothermal resources are located in the Salton Sea region.

Geothermal Alternative Scenario. There is no single 250 MW geothermal project that would be viable as an alternative to the GSEP. Approximately 2-7 smaller projects would be required to achieve 250 MW of geothermal energy. The amount of land required for a geothermal facility varies greatly. Two hundred and fifty MW of geothermal energy could require the use of many thousands of acres of land. However, the amount of ground disturbance on that area would be less than 10 percent. Additionally, while components of the power plant, cooling towers and brine ponds would likely be fenced, there would not likely be fencing required for the wells and well pads. In that 2-7 geothermal facilities would be required for provision of 250 MW, depending on the locations of the new facilities, more transmission lines and switchyards with corresponding potential impacts (i.e., biological, cultural, soil & water, land use, visual) may be required for grid interconnection, when compared to the proposed GSEP.

Environmental Assessment. Concerns regarding geothermal power plants include air quality, hazardous materials, and geology. Benefits from geothermal power plants include an increased reliability and less ground disturbance than some renewable resources, including solar.

Air Quality. Toxic air contaminants and odors would be emitted as a result of fuel combustion in construction-related equipment and vehicles and as a result of geothermal steam released during well testing. Hydrogen sulfide (H_2S) in geothermal steam is a toxic air contaminant and a colorless, flammable, poisonous compound with a characteristic rotten-egg odor. Ammonia also occurs in geothermal steam and is a toxic air contaminant with a pungent, penetrating odor. Ammonia is also a precursor pollutant to particulate matter in the ambient air. Releasing geothermal steam during well testing and development would cause substantial emissions of these toxic air contaminants and odors over the construction phase. Aside from closely managing the well testing schedule, few mitigation options are available, and the impact of toxic air contaminants and odors during construction would be significant and unavoidable.

Extracting power from geothermal steam equipment can cause emissions of ammonia and H_2S, which are odors and toxic air contaminants present in the geothermal brine. Ammonia emissions also react with ambient air to form inhalable PM10, and H_2S in the atmosphere will oxidize to SO_2 and sulfuric acid. Without proper control, emissions of these contaminants would cause increased health risks, create objectionable odors, and cause or substantially contribute to violations of H_2S and/or PM10 ambient air quality standards. These contaminants would be emitted during any short-term commissioning activities or uncontrolled releases of geothermal steam, but these impacts would be less than significant because they would be short-term and managed in accordance with permitting requirements.

Ammonia and H_2S emissions could be avoided with sulfur control systems and use of an air-cooling system to reduce cooling tower drift. Commonly, water cooling causes the geothermal fluid entering the cooling tower to be emitted to the atmosphere as water vapor, which results in high levels of ammonia and H_2S in the vapor from the cooling tower. However, a binary cycle plant emits only fresh water vapor from the cooling tower. Cool geothermal brine is injected into the ground after the energy is extracted.

Hazardous Materials. Geothermal plants can also produce waste and byproducts that can have significant impacts. The most potentially harmful gas generally encountered in geothermal systems is H_2S, which at concentrations higher than 30 parts per million (ppm) is toxic (CEC 2003). It can cause a variety of problems including dizziness, vomiting, and eventually death if one is exposed for long periods of time. In concentrations above 100 ppm, H_2S can be fatal. H_2S is heavier than air and can accumulate in low-lying areas (equipment pits, ravines, and other depressions) and become concentrated over time.

H_2S releases could potentially be of concern during drilling, well testing, and plant start-up and shut-down operations, although recent technology improvements in atmospheric separators can significantly decrease emissions and noise during these operations. H_2S is now often abated at geothermal power plants, resulting in a conversion of close to 100 percent of the H_2S into elemental sulfur (GEA 2007). Since 1976, H_2S emissions have decreased from 1,900 pounds per hour to 200 pounds per hour despite an increase in geothermal power production from 500 MW to 2,000 MW (GEA 2007).

One additional concern regarding hazardous materials present in geothermal facilities includes the possibility for bacterial growth to occur in the cooling tower, including Legionella. Legionella is a type of bacteria that grows in water and causes Legionellosis, otherwise known as Legionnaires' disease. Untreated or inadequately treated cooling systems in the United States have been correlated with outbreaks of Legionellosis. These outbreaks are usually associated with building heating, ventilating, and air conditioning (HVAC) systems but it is possible for growth to occur in industrial cooling towers. In order to ensure that Legionella growth is kept to a minimum, mitigation would require the project owner to prepare and implement a biocide and anti-biofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. With the use of an aggressive antibacterial program coupled with routine monitoring and biofilm removal, the chances of Legionella growing and dispersing would be reduced to insignificance.

Geology, Paleontology, and Minerals. Active seismicity and subsidence generally occur in areas with high levels of tectonic activity (e.g., volcanic regions, fault zones), which are the same areas in which geothermal resources occur; therefore, it is difficult to discern between power plant-induced and naturally occurring seismicity and subsidence. Drilling deep into the earth's crust to access high-temperature geothermal resources and subsequent re-injection of fluid into the geothermal reservoir may result in microearthquakes, which are generally below magnitude 2-3 on the Richter scale. These microearthquakes are typically centered on the injection site and are too low to be noticed by humans (Kagel 2007).

Land Use. Geothermal power projects require less ground disturbance than almost any other energy source, typically from about 0.2 to 0.5 acres per MW; however, geothermal plants must be built where the resource is since the steam cannot be piped long distances without significant heat loss. This results in a highly secure and predictable fuel supply and some inflexibility in siting. It may also result in a long interconnection requirement to reach a transmission system.

Because of the minimal ground disturbance required, impacts to biological resources and cultural resources would likely be minimized compared to the GSEP.

Reliability. Geothermal facilities may achieve a 95 percent or higher availability (CEC 2003). Because the geothermal steam is available throughout the day, geothermal facilities provide an adequate level of reliability throughout the entire day.

Rationale for Elimination

Geothermal generation is a commercially available technology and is important for California's renewable energy future because it provides baseload power that is available 24 hours a day. It also can be developed with substantially less ground disturbance than that needed for the GSEP, so impacts related to biological and cultural resources, water and soils resources, and traffic/transportation would reduced. However, despite the encouragement provided by Renewable Portfolio Standard targets and ARRA funding, few new projects have been proposed and no geothermal projects are included on the Renewable Energy Action Team list of projects requesting ARRA funds. Therefore, while the technology is clearly feasible and additional development is expected, the technology is not retained for detailed analysis in this RSA

Biomass Energy

Electricity can be generated by burning organic fuels in a boiler to produce steam, which then turns a turbine; this is biomass generation. Biomass can also be converted into a fuel gas such as methane and burned to generate power. Wood is the most commonly used biomass for power generation. Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing wastes, and construction and urban wood wastes. Several techniques are used to convert these fuels to electricity, including direct combustion, gasification, and anaerobic fermentation. Biomass facilities do not require the extensive amount of land required by the other renewable energy sources discussed, but they generate much smaller amounts of electricity.

Currently, nearly 19 percent of the state's renewable electricity derives from biomass and waste-to-energy sources (CEC 2007). Most biomass plant capacities are in the 3- to 10-MW range and typically operate as baseload capacity. The average size of a sales generation biomass plant is 21 MW (CBEA 2008). Unlike other renewables, the locational flexibility of biomass facilities would reduce the need for significant transmission investments. Solid fuel biomass (555 MW) makes up about 1.75 percent of the state's electricity, and landfill gas generation (260 MW) makes up about 0.75 percent. Existing landfills not now producing electricity from gas could add a maximum of about 170 MW of new generation capacity (CBEA 2008).

Biomass Resources at the GSEP Site. Biomass resources are not viable at the GSEP site (NREL 2009) due to its remote location and distance from the agricultural production areas surrounding Blythe. Transportation of agricultural waste to this site would result in generation of additional vehicle emissions that would offset the potential benefits of using a renewable fuel.

Environmental Assessment. Generally, small amounts of land are required for biomass power facilities; however, a biomass facility should be sited near a relatively

large source of biomass in order to minimize the cost and impacts of bringing the biomass waste to the facility.

Operational noise impacts may be a concern, originating from truck engines as a result hauling operations coming from and going to the facility repeatedly on a daily basis. Other operations of the biomass facilities, while internal to the main structure, can result in increased noise due to the material grinding equipment.

The emissions due to biomass fuel-fired power plant operation are generally unavoidable. Direct impacts of criteria pollutants could cause or contribute to a violation of the ambient air quality standards. Significant impacts can potentially occur for PM10 and ozone because emissions of particulate matter and precursors and ozone precursors would contribute to existing violations of the PM10 and ozone standards. Biomass/biogas facility emissions could also adversely affect visibility and vegetation in federal Class I areas or state wilderness areas, which would significantly deteriorate air quality related values in the wilderness areas. Toxic air contaminants from routine operation would also cause health risks that could locally adversely affect sensitive receptors.

Rationale for Elimination

Most biomass facilities produce only small amounts of electricity (in the range of 3 to 10 MW) and so could not meet project objectives. Biomass facilities also generate significant air emissions and require numerous truck deliveries to supply the plant with the waste. Also, in waste-to-energy facilities, there is some concern regarding the emission of toxic chemicals, such as dioxin, and the disposal of the toxic ash that results from biomass burning. Therefore, this technology is not analyzed in detail as an alternative to the GSEP project.

Tidal Energy

The oldest technology to harness tidal power for the generation of electricity involves building a dam, known as a *barrage*, across a bay or estuary that has large differences in elevation between high and low tides. Water retained behind a dam at high tide generates a power head sufficient to generate electricity as the tide ebbs and water released from within the dam turns conventional turbines.

Certain coastal regions experience higher tides than others. This is a result of the amplification of tides caused by local geographical features such as bays and inlets. In order to produce practical amounts of power for tidal barrages, a difference between high and low tides of at least 5 meters is required. There are about 40 sites around the world with this magnitude of tidal range. The higher the tides, the more electricity can be generated from a given site and the lower the cost of electricity produced. Worldwide, existing power plants include a 240-MW plant in France, a 20-MW plant in Nova Scotia, and a 0.5-MW plant in Russia (EPRI 2006).

Tidal Fences

Tidal fences are effectively barrages that completely block a channel. If deployed across the mouth of an estuary, they can be very environmentally destructive. However, in the 1990s, their deployment in channels between small islands or in straits between the

mainland and islands was increasingly considered a viable option for generation of large amounts of electricity.

The advantage of a tidal fence is that all the electrical equipment (generators and transformers) can be kept high above the water. Also, by decreasing the cross-section of the channel, current velocity through the turbines is significantly increased.

The United Kingdom is currently considering the feasibility of tidal energy across the Bristol Channel. The feasibility study began with the consideration of the Severn tidal barrage. The barrage would work similarly to a dam which generates hydroelectric power by holding water back before it is allowed to flow at speed through a pipe at the base of the dam to drive the turbines (BBC 2007). Since then, alternative tidal projects have been proposed, including a tidal fence that would allow shipping to move freely and keep ports at Cardiff and Bristol open (BBC 2008). The results of the feasibility study are expected to be published in 2010; however, preliminary results from the Sustainable Development Commission confirmed the potential of the huge Severn tidal range to generate approximately 5 percent of United Kingdom's electricity (BIS 2009).

Tidal Turbines

Tidal turbines are the chief competition to the tidal fence. Looking like an underwater wind turbine, they offer a number of advantages over the tidal fence. They are less disruptive to wildlife, allow small boats to continue to use the area, and have much lower material requirements than the fence.

Tidal turbines function well where coastal currents run at 2 to 2.5 meters per second (slower currents tend to be uneconomic while larger ones stress the equipment). Such currents provide an energy density four times greater than air, meaning that a 15-meter-diameter turbine will generate as much energy as a 60-meter-diameter windmill. In addition, tidal currents are both predictable and reliable, a feature which gives them an advantage over both wind and solar systems. The tidal turbine also offers significant environmental advantages over wind and solar systems; the majority of the assembly is hidden below the waterline, and all cabling is along the sea bed.

There are many sites around the world where tidal turbines could be effectively installed. The ideal site is close to shore (within 1 kilometer) in water depths of about 20 to 30 meters. In April 2007, the first major tidal-power project was installed in the United States off New York City's Roosevelt Island (Fairley 2007). The Roosevelt Island Tidal Energy (RITE) project completed the Phase 2 Demonstration at the end of 2008. This phase included operating six full-scale turbines and resulted in 70 MW hours of energy delivered to two end users (Verdant 2009). Phase 3 of the RITE project is currently underway, and Verdant Power applied to the Federal Energy Regulatory Commission for a pilot license in November 2008. If granted, this license would allow Verdant Power to build out the RITE Project in the east channel of the East River to a 30-turbine 1 MW pilot project and to commercially deliver the energy generated by the field (Verdant 2009).

Turbines such as those used in New York City use in-flow turbines, thereby lessening the environmental impacts. A study conducted in 2006, *System Level Design, Performance, Cost and Economic Assessment – San Francisco Tidal In-Stream Power*

Plant, concluded that a tidal plant located under the Golden Gate Bridge could create approximately 35 MW of power with no significant impacts to the environment and recommended further research and development into both ocean energy technology and a pilot project in San Francisco (EPRI 2006a).

Environmental Assessment. Tidal technologies, especially tidal fences, have the potential to cause significant biological impacts, especially to marine species and habitats. Fish could be caught in the unit's fins by the sudden drop in pressure near the unit. The passageways, more than 15 feet high and probably sitting on the bay floor, could squeeze out marine life that lives there or alter the tidal flow, sediment build-up, and the ecosystem in general. Even the in-flow turbines can have environmental impacts on marine systems. The in-flow turbines off New York City underwent environmental monitoring for 18 months to ensure the turbines would not create environmental impacts to the river's marine wildlife. The results thus far show no observed evidence of increased fish mortality or injury; however, Verdant will continue to monitor activities during the Phase 3 build-out of the project to analyze impact from larger arrays (Verdant 2009). Also, depending on the location of the tidal technology, commercial shipping could be disrupted during construction.

The reduced tidal range (difference between high and low water levels) resulting from tidal energy generation can destroy inter-tidal habitat used by wading birds. Sediment trapped behind the barrage could also reduce the volume of the estuary over time.

Rationale for Elimination

Tidal fence technology is a commercially available technology in Europe, although limited to areas that are adjacent to a body of water with a large difference between high and low tides, and it creates significant environmental impacts to ocean ecosystems. In-flow tidal turbines are a relatively new technology and are not considered an alternative to the GSEP project because they are an unproven technology at the scale that would be required to replace the proposed project. Additionally, the environmental impacts of tidal turbines are still under review, as demonstrated by the pilot project under continued environmental monitoring in New York. Therefore, this technology is not analyzed in detail in this RSA as an alternative to the GSEP.

Wave Energy

Wave power technologies have been around for nearly 30 years. Setbacks and a general lack of confidence have contributed to slow progress towards proven devices that would have a good probability of becoming commercial sources of electrical power.

The highest energy waves are concentrated off the western coasts in the 40° to 60° latitude range north and south. The power in the wave fronts varies in these areas between 30 and 70 kilowatts per meter (kW/m) with peaks up to 100 kW/m in the Atlantic southwest of Ireland, the Southern Ocean and off Cape Horn. Many wave energy devices are still in the research and development stage and would require large amounts of capital to get started. Additional costs from permitting and environmental assessments also make wave energy problematic (WEC 2007). Nonetheless, wave energy is likely to increase in use within the next 5 to 10 years.

The total power of waves breaking on the world's coastlines is estimated at 2 to 3 million megawatts. In favorable locations, wave energy density can average 65 MW per mile of coastline. Three approaches to capturing wave energy are:

- **Floats or Pitching Devices.** These devices generate electricity from the bobbing or pitching action of a floating object. The object can be mounted to a floating raft or to a device fixed on the ocean floor.
- **Oscillating Water Columns.** These devices generate electricity from the wave-driven rise and fall of water in a cylindrical shaft. The rising and falling water column drives air into and out of the top of the shaft, powering an air-driven turbine.
- **Wave Surge or Focusing Devices.** These shoreline devices, also called "tapered channel" or "tapchan" systems, rely on a shore-mounted structure to channel and concentrate the waves, driving them into an elevated reservoir. Water flow out of this reservoir is used to generate electricity, using standard hydropower technologies.

In December 2007, PG&E signed a power purchase agreement with Finavera Renewables, which had planned to operate a wave farm approximately 2.5 miles off the coast of Eureka, California. The agreement was for 2 MW of power beginning in 2012. On October 16, 2008, the California Public Utilities Commission rejected PG&E's request for approval of a renewable resource procurement contract with Finavery Renewables because, among other reasons, the CPUC concluded the project had not been shown to be viable. As stated in the decision, there is significant uncertainty surrounding wave technology and the wave energy industry is at a beginning stage (CPUC 2008). The CPUC did authorize up to $4.8 million for PG&E to undertake its WaveConnect project in D.09-01-036. WaveConnect is designed to document the feasibility of a facility that converts wave energy into electricity by using wave energy conversion (WEC) devices in the open ocean adjacent to PG&E's service territory.

In January 2010, the California State Lands Commission and the Federal Energy Regulatory Commission issued a Request for Statements of Interest to prepare an environmental document for the PG&E WaveConnect project discussed above. PG&E has selected a wave energy project siting area that is between 2.5 and 3.0 nautical miles (nm) from the shore in Humboldt County. WaveConnect consists of: (1) wave energy converters (WECs) including multi-point catenary moorings and anchors; (2) marker buoys, navigation lights, and environmental monitoring instruments; (3) subsea electrical cables extending on-shore to (4) land-based power conditioning equipment; (5) an above-ground transmission line and interconnection to the electrical grid; (6) data acquisition and telemetry equipment; and (7) security and safety equipment.

Environmental Assessment. The environmental impacts of wave power have yet to be fully analyzed. A recent study published by the U.S. Department of Commerce and National Oceanic and Atmospheric Administration listed a number of potentially significant environmental impacts created by wave power (Boehlert 2008). These include (Boehlert 2008):

- Significant reduction to waves with possible effects to beaches (e.g. changes to sediment transport processes).

- The use of buoys may have positive effects on forage fish species, which in turn could attract larger predators. Structures need to reduce potential entanglement of larger predators, especially marine turtle species.
- Modifications to water circulation and currents may result in changes to larval distribution and sediment transport.
- Wave energy development may affect community structures for fish and fisheries.
- Lighting and above-water structures may result in marine bird attraction and collisions and may alter food webs and beach processes.
- A diversity of concerns would arise regarding marine mammals including entanglement issues.
- Energy-absorbing structures may affect numerous receptors and should avoid sensitive habitats.
- Chemicals used in the process must be addressed both for spills and for a continuous release such as in fouling paints.
- New hard structures and lighting may break loose and increase debris accumulation.
- Impacts on fish and marine mammals caused by noise coming from the buoys should be understood and mitigated.
- Electromagnetic effects may affect feeding or orientation and should be better understood.
- Impact thresholds need to be established. As projects scale up in location or implementation, new risks may become evident.

Rationale for Elimination

Wave energy is new and may not be technologically feasible; as stated above, PG&E is proposing to sponsor a project to test the feasibility of harnessing wave energy. Additionally, wave power must be located where waves are consistently strong; even then, the production of power depends on the size of waves, which result in large differences in the amount of energy produced. Wave technology is not considered an alternative to the GSEP because is an unproven technology at the scale that would be required to replace the proposed project and because it may also result in substantial adverse environmental impacts. Therefore, this technology is not analyzed in detail in this RSA as an alternative to the GSEP.

B.2.8.4 ALTERNATIVE METHODS OF GENERATING OR CONSERVING ELECTRICITY

Nonrenewable generation technologies that require use of natural gas, coal, or nuclear energy would not achieve the key project objective for GSEP: to construct and operate an approximately 250 MW project that would contribute clean, renewable solar energy to the State of California's renewable energy goals.

These generation technologies would not be practical at the GSEP site due to the lack of available fuels at the site and the distance of the site from major access roads. While these generation technologies would not achieve this key objective, nor would they be

practical at the GSEP site, they are presented here in brief for the benefit of the public and decision makers. Conservation and demand-side management is also briefly addressed in this section.

The following topics are considered in this analysis:

- natural gas
- coal
- nuclear energy
- conservation and demand-side management

Of the nonrenewable generation alternatives (natural gas, coal, and nuclear), only the natural gas-fired power plants would be viable alternatives within California. However, gas-fired plants would fail to meet a major project objective: to construct and operate a renewable power generating facility in California capable of selling competitively priced renewable energy consistent with the needs of California utilities, and would therefore not achieve the purpose and need of the project. Because these alternatives would not support renewable power generation within California, and could have significant environmental impacts of their own, they were eliminated from further consideration.

None of these non-renewable energy technologies would meet the BLM's purpose and need, which is to approve, modify, or deny the applicant's request for a right-of-way and to help develop reliable sources of renewable energy in California. These technologies would be too great a departure from the application to be considered a modification of the applicant's proposal

Natural Gas Generation

Natural gas power generation accounts for approximately 22 percent of all the energy used in the United States and comprises 40 percent of the power generated in California (CEC 2007). Natural gas power plants typically consist of combustion turbine generators, heat recovery steam generators, a steam turbine generator, wet or dry cooling towers, and associated support equipment. An interconnection with a natural gas pipeline, a water supply, and electric transmission are also required.

A gas-fired power plant generating 250 MW would generally require less than 50 acres of land.

Environmental Assessment. Natural gas power plants may result in numerous environmental impacts such as the following.

- Overall air quality impacts would increase because natural gas-fired power plants contribute to local violations of PM10 and ozone ambient air quality standards, and operational emissions could result in toxic air contaminants that could adversely affect sensitive receptors. Net increases in greenhouse gas emissions due to natural gas-firing in the conventional power plants would also be significant.
- Environmental justice may be a concern. Gas-fired power plants tend to be located in developed urban areas that are zoned for heavy industry. In some instances, low-income and minority populations are also located in such areas.

- In order to avoid land use impacts, natural gas-fired power plants must be consistent with local jurisdiction zoning.
- Several hazardous materials, including regulated substances (aqueous ammonia, hydrogen, and sulfuric acid), would be stored at a natural gas power plant during operation. Aqueous ammonia would be stored in amounts above the threshold quantity during the final stages of construction, initial start-up, and operations phase. Transport of hazardous materials during power plant operation includes delivery of aqueous ammonia and removal of wastes. During operation, the aqueous ammonia transporter would be required to obtain a Hazardous Material Transportation License in accordance with California Vehicle Code section 32105 and would be required to follow appropriate safety procedures and routes.
- Cultural impacts can be severe depending on the power plant siting; however, because natural gas power plants require significantly fewer acres per megawatt of power generated, impacts to cultural resources would be expected to be fewer than with solar facilities.
- Power plant siting may result in the withdrawal of agricultural lands. However, because natural gas power plants require significantly fewer acres per megawatt of power generated, impacts to agriculture would be expected to be less than with solar facilities should they be sited on agricultural lands.
- Visual impacts may occur with natural gas power plants because they introduce large structures with industrial character. The most prominent structures are frequently the cooling towers, which may reach 100 feet tall, and the power plant stacks, which may reach over 100 feet tall. Visible plumes from the cooling tower would also potentially occur.

Rationale for Elimination

Although natural gas generation is clearly a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. The air quality impacts of gas-fired plants include emission of greenhouse gases and are one major reason that California's Renewable Portfolio Standard was developed. Therefore, this alternative is not considered in detail as an alternative to the GSEP.

Coal Generation

Coal-fired electric generating plants are the cornerstone of America's central power system. Traditional coal-fired plants generate large amounts of greenhouse gases. New "clean coal technology" includes a variety of energy processes that reduce air emission and other pollutants from coal-burning power plants. The Clean Coal Power Initiative is providing government co-financing for new coal technologies that help utilities meet the Clear Skies Initiative to cut sulfur, nitrogen, and mercury pollutants by nearly 70 percent by 2018. The Clean Coal Power Initiative is now focusing on developing projects that utilize carbon sequestration technologies and/or beneficial reuse of carbon dioxide (DOE 2008). However, these technologies are not yet in use.

In 2006, approximately 15.7 percent of the energy used in California came from coal fired sources; 38 percent of this was generated in state, and 62 percent was imported

(CEC 2007). The in-state coal-fired generation includes electricity generated from out-of-state, coal-fired power plants owned by and reported by California utilities (CEC 2007). In 2006, California enacted SB 1368 (Perata, Chapter 598, Statutes of 2006), which prohibits utilities from making long-term commitments for electricity generated from plants that create more carbon dioxide (CO_2) than clean-burning natural gas plants (CEC 2007).

Environmental Assessment. Coal-fired power plants may also result in numerous environmental impacts such as the following.

- Overall, air quality impacts would increase because coal-fired power plants contribute carbon dioxide, sulfur dioxide, nitrogen oxides, mercury, and fly ash (USEPA 2008a). Mining, cleaning, and transporting coal to the power plants generates additional emissions. Average emissions of a coal-fired power plant are 2,249 pounds per megawatt hour of carbon dioxide, 13 pounds per megawatt hour of sulfur dioxide and 6 pounds per megawatt hour of nitrogen oxides (EPA 2008a). Net increases in greenhouse gas emissions due to coal-firing in the conventional power plants would be significant.
- Health risks associated with power plants have also been documented, including problems associated with exposure to fine particle pollution or soot, an increase in asthma, and an increase in non-fatal heart attacks.
- Large quantities of water are generally required to produce steam and for cooling. When coal-fired power plants use water from a lake or river, fish or other aquatic life can be impacted (EPA 2008).

Rationale for Elimination

Although coal generation is a viable technology, it is not a renewable technology, so it would not attain the objective of generating renewable power meeting California's renewable energy needs. Existing technology for coal-fired plants results in high greenhouse gas emissions. Therefore, coal generation was eliminated from detailed analysis.

Nuclear Energy

Due to environmental and safety concerns, California law currently prohibits the construction of any new nuclear power plants in California until the California Energy Commission finds that the federal government has approved and there exists a demonstrated technology for the permanent disposal of spent fuel from these facilities (CEC 2006). In June 1976, California enacted legislation directing the Energy Commission to perform an independent investigation of the nuclear fuel cycle. This investigation was to assess whether the technology to reprocess nuclear fuel rods or to dispose of permanently high-level nuclear waste had been demonstrated and approved and was operational (Public Resources Code §§ 25524.1 (a)(1), 25524.1 (b), and 25524.2 (a)). After extensive public hearings, the Energy Commission determined that it could not make the requisite affirmative findings concerning either reprocessing of nuclear fuel or disposal of high-level waste. This information was published in a report: *Status of Nuclear Fuel Reprocessing, Spent Fuel Storage and High-level Waste Disposal*, Energy Commission publication P102-78-001, January 1978.) As a result, the development of new nuclear energy facilities in California was prohibited by law.

It has been more than 25 years since the last comprehensive Energy Commission assessment of nuclear power issues. The *Nuclear Power in California: 2007 Status Report*, published in October of 2007, gives a detailed description of the current nuclear waste issues and their implications for California. This was prepared as part of the development of the Energy Commission's *2007 Integrated Energy Policy Report* (CEC 2007a).

Rationale for Elimination

The permitting of new nuclear facilities in California is currently illegal, so this technology is infeasible.

Conservation and Demand-Side Management

Conservation and demand-side management consist of a variety of approaches to reduction of electricity use, including energy efficiency and conservation, building and appliance standards, and load management and fuel substitution. In 2005 the Energy Commission and CPUC's Energy Action Plan II declared cost-effective energy efficiency as the resource of first choice for meeting California's energy needs. The Energy Commission noted that energy efficiency helped flatten the state's per capita electricity use and saved consumers more than $56 billion since 1978 (CPUC 2008). The investor-owned utilities' 2006-2008 efficiency portfolio marks the single-largest energy efficiency campaign in U.S. history, with a $2 billion investment by California's energy ratepayers (CPUC 2008). However, with population growth, increasing demand for energy, and the need to reduce greenhouse gases, there is a greater need for energy efficiency.

The CPUC, with support from the Governor's Office, the Energy Commission, and the California Air Resources Board, among others, adopted the California Long-Term Energy Efficiency Strategy Plan for 2009 to 2020 in September 2008 (CPUC 2008). The plan is a framework for all sectors in California including industry, agriculture, large and small businesses, and households. Major goals of the plan include:

- All new residential construction will be zero net energy by 2020;
- All new commercial construction will be zero net energy by 2030;
- Heating, ventilation, and air conditioning industries will be re-shaped to deliver maximum performance systems;
- Eligible low-income customers will be able to participate in the Low Income Energy Efficiency program and will be provided with cost-effective energy efficiency measures in their residences by 2020.

Rationale for Elimination

Conservation and demand-side management is important for California's energy future and cost effective energy efficiency is considered as the resource of first choice for meeting California's energy needs. However, with population growth and increasing demand for energy, conservation and demand-management alone is not sufficient to address all of California's energy needs. Additionally, it will not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements, so technologies, like solar thermal generation, would be required.

B.2.9 RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no comments on the Alternatives section of the Staff Assessment (SA) for the proposed Genesis Solar Energy Project (GSEP).

B.2.10 CONCLUSIONS OF ALTERNATIVES ANALYSIS

In this analysis of the GSEP, 25 alternatives to the proposed GSEP were developed and evaluated. These include six alternative sites, solar and renewable technologies, generation technologies using different fuels, and conservation/demand-side management. Of the 25 alternatives, three alternatives were determined to be potentially feasible by the Energy Commission and have the potential to result in reduced impacts in comparison with the proposed project: the Reduced Acreage Alternative, the Gabrych Alternative, and the Dry Cooling Alternative. Additionally the Energy Commission considered the No Project/No Action Alternative.

The Reduced Acreage Alternative would be half as large as the proposed project and was found to reduce the impacts of the proposed GSEP by approximately 50 percent. It would affect substantially less Mojave fringe-toed lizard habitat, would substantially reduce the geomorphic impacts, and would create no impacts to the Chuckwalla and Palen-McCoy sand corridors. However, as highlighted in the Section C.1 (Air Quality), the Reduced Acreage Alternative would reduce the benefits of the proposed GSEP by approximately 50 percent. While the Reduced Acreage Alternative would meet most project objectives, it is uncertain whether the Reduced Acreage Alternative is economically feasible at this time. As with the proposed GSEP, a land use plan amendment to the California Desert Conservation Area (CDCA) Plan of 1980 would be required before BLM could issue the ROW grant for the Reduced Acreage Alternative. The Reduced Acreage Alternative would be potentially feasible, and would reduce impacts in comparison to the proposed project. However, while it would reduce impacts by approximately one-half, it would not eliminate any significant impacts of the proposed project.

The Dry Cooling Alternative was found to have similar impacts for most resource elements. However, it would reduce impacts to groundwater-dependent ecosystems, use substantially less water than the proposed project, and reduce impacts of the visible vapor plumes that the proposed project would create with use of cooling towers. The Dry Cooling Alternative was found to reduce the efficiency of the steam power cycles, which would slightly reduce the total amount of power generated. As a result, the benefits of the GSEP in replacing gas-fired power plants and associated greenhouse gases would be reduced. The Dry Cooling Alternative meets most project objectives. At this time, it appears to be economically feasible as alternative to GESP's use of wet cooling.

The Gabrych Alternative site would have impacts similar to those of the proposed site in many resource elements. However, the alternative is likely to have less severe cultural impacts and would also have reduced impacts to biological resources. The alternative is potentially feasible and would reduce impacts in comparison with the proposed project. However, due to the number of parcels that would have to be acquired, obtaining site control may be more challenging at this site. In addition, detailed site engineering and

transmission interconnection would require additional time for this site to be developed; as a result this alternative would not meet the project objective requiring that a decision to be made in 2010.

Alternative solar thermal technologies (Stirling engine systems, solar power tower, utility scale solar photovoltaics, and linear Fresnel) were also evaluated. As compared with the proposed GSEP, these technologies would not substantially change the severity of visual, biological resources and cultural resources impacts, although the land requirements vary among the technologies. Rooftop solar PV facilities would require extensive acreage although it would minimize the need for undisturbed or vacant land. However, increased deployment of rooftop solar PV faces challenges in manufacturing capacity, cost, and policy implementation.

Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the proposed GSEP. These technologies would either be infeasible at the scale of the GSEP, or would not eliminate substantial adverse impacts caused by the GSEP without creating their own substantial adverse impacts in other locations. A natural gas plant would contribute to greenhouse gas emissions and would not meet the project's renewable generation objective. Construction of new nuclear power plants is currently prohibited under California law.

Conservation and demand side management programs would likely not meet the state's growing electricity needs that could be served by the GSEP. In addition, these programs would not provide the renewable energy required to meet the California Renewable Portfolio Standard requirements.

CEC Staff also concludes that the No Project Alternative is not superior to the proposed project. This alternative would likely delay development of renewable resources or shift renewable development to other similar areas, and would lead to increased operation of existing power plants that use non-renewable technologies.

B.2.10 REFERENCES

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FIGURES FOR ALTERNATIVES SECTION (FOLLOWING THIS PAGE)

Alternatives Figure 1: Reduced Acreage Alternative

Alternatives Figure 2: Dry Cooling Alternative Layout

Alternatives Figure 3: Gabrych Alternative

Alternatives Figure 4: Site Alternatives Eliminated

Alternatives Figure 5: Solar Technologies (Stirling)

Alternatives Figure 6: Solar Technologies (Power Tower)

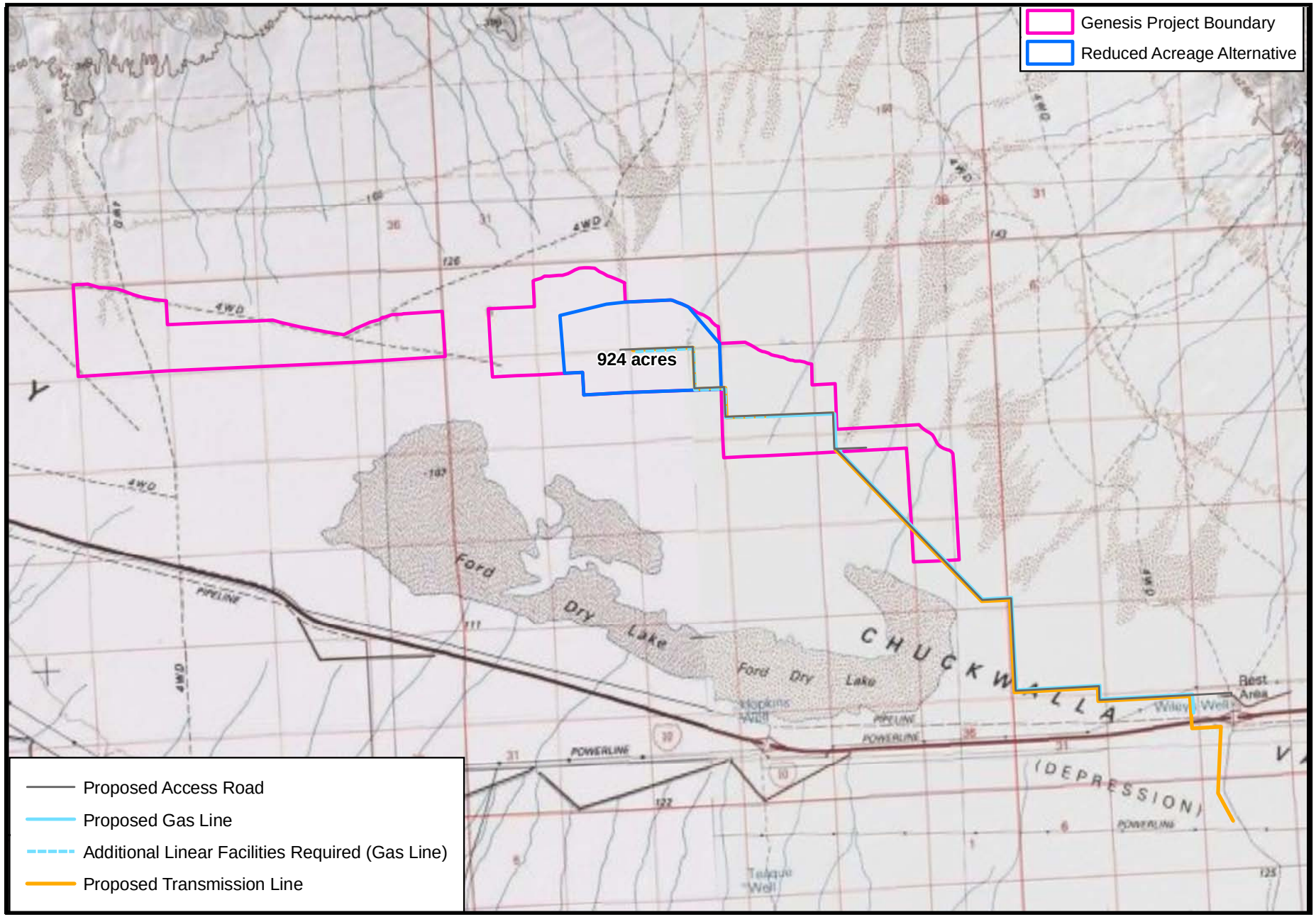
Alternatives Figure 7: Solar Technologies (Photovoltaics)

APPENDICES TO ALTERNATIVES SECTION

1. List of bio species on Gabrych Alternative
2. LESA model results for Gabrych Alternative

ALTERNATIVES - FIGURE 1

Genesis Solar Energy Project - Reduced Acreage Alternative

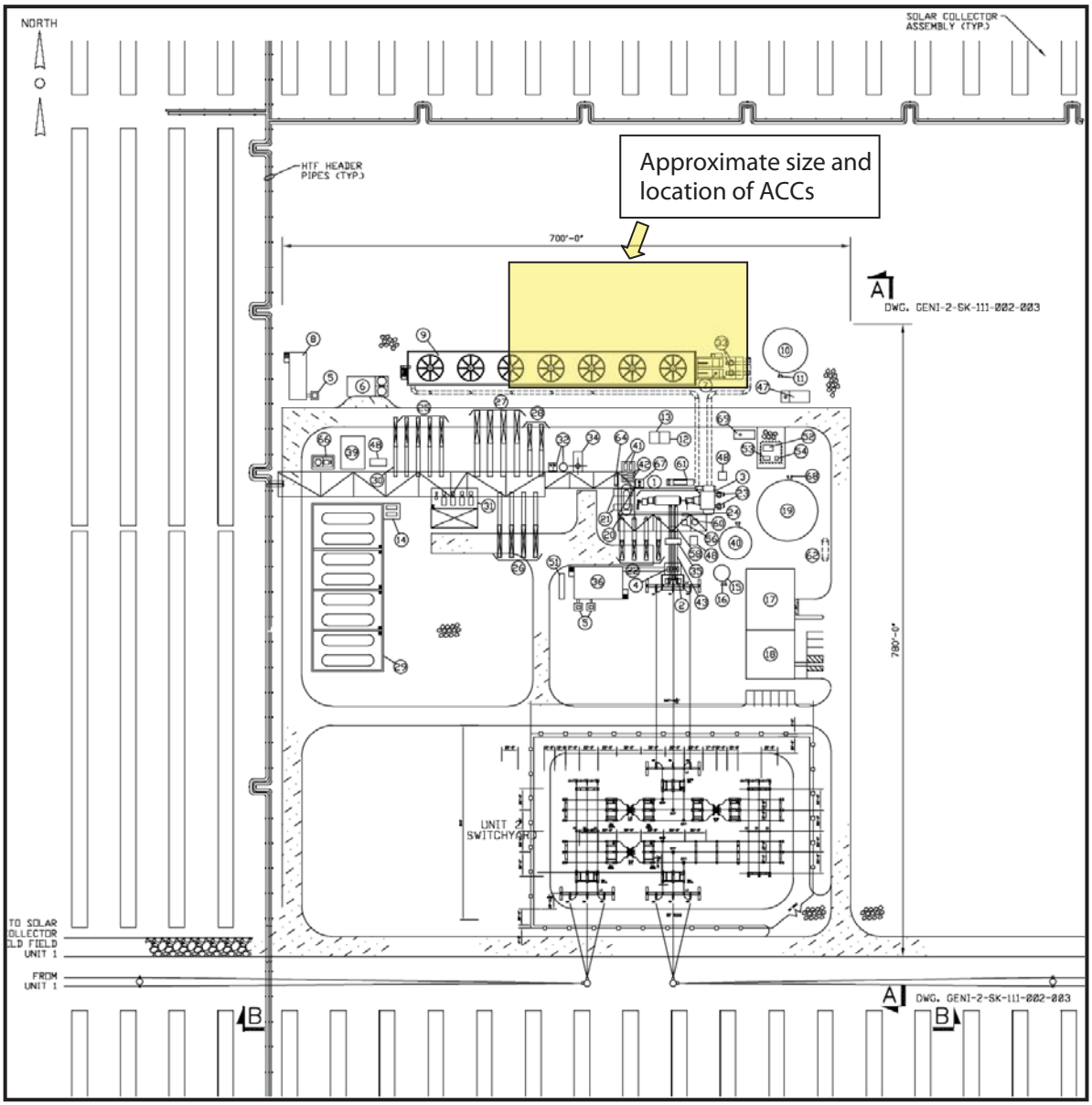


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009a

ALTERNATIVES - FIGURE 2

Genesis Solar Energy Project - Dry Cooling Alternative



Shaded box indicates location of Air Cooled Condenser for one of the two Genesis power blocks.

EQUIPMENT DESCRIPTIONS

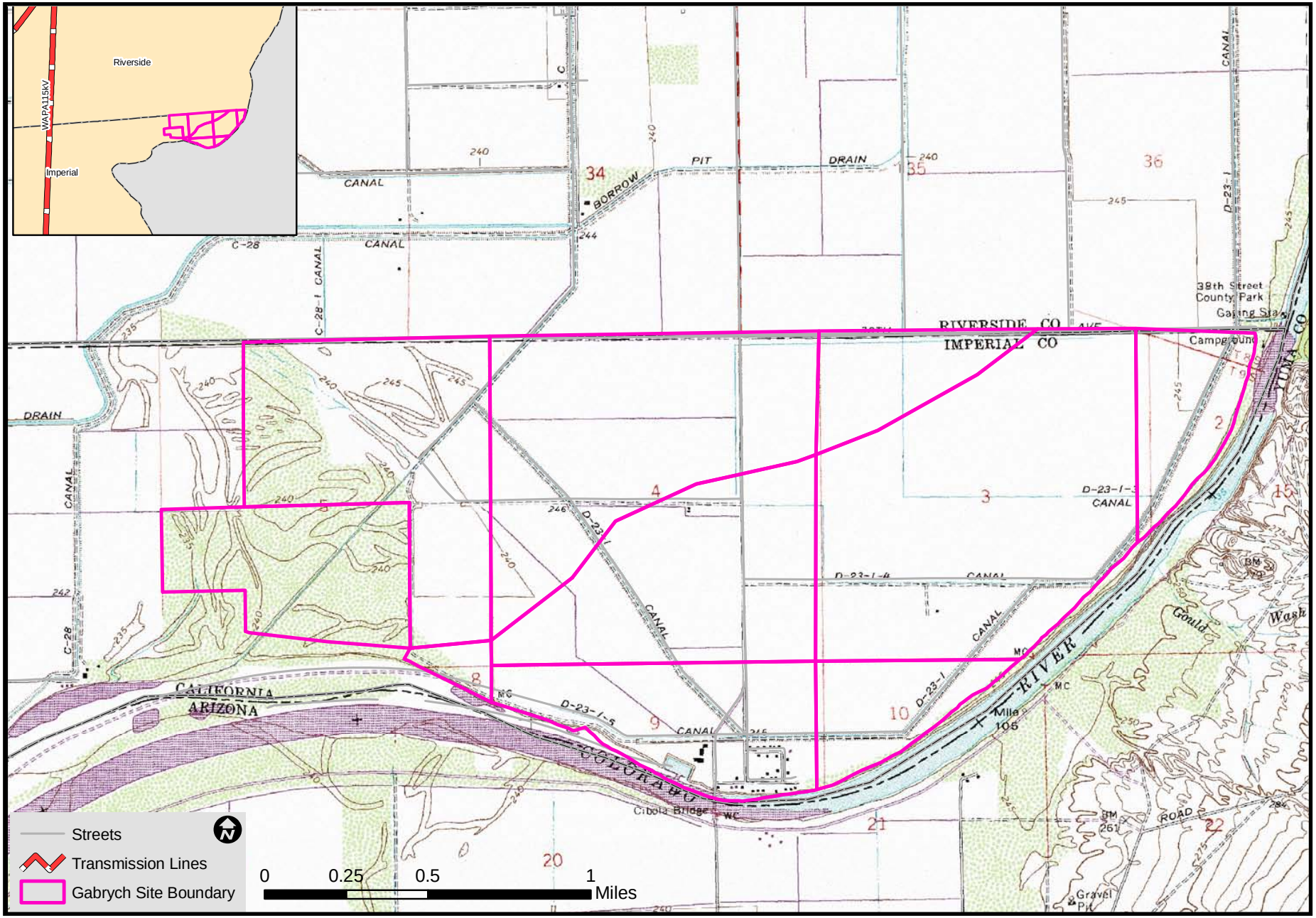
1 STEAM TURBINE/GENERATOR
2 GSU TRANSFORMER
3 SURFACE CONDENSER
4 UNIT AUXILIARY TRANSFORMER
5 STATION SERVICE TRANSFORMERS
6 COOLING TOWER CHEMICAL FEED/STORAGE AREA
7 AUXILIARY COOLING PUMP (BACK-UP/START-UP)
8 COOLING TOWER ELECTRICAL ENCLOSURE
9 COOLING TOWER
10 RAW, FIRE, TANK (500,000 GAL)
11 SERVICE WATER PUMPS
12 CO2 BOTTLE STORAGE
13 H2 BOTTLE STORAGE
14 OVERFLOW TANK PUMPS
15 DEMIN WATER STORAGE TANK (40,000 GAL)
16 DEMIN WATER PUMP SKID
17 WATER TREATMENT AREA (CYCLE CHEM FEED, DEMIN TRAIN, MMF, RO, SAMPLE PANEL, LAB, AIR COMP)
18 CONTROL ROOM/WAREHOUSE BUILDING
19 TREATED WATER TANK (1,250,000 GAL)
20 DEAERATOR/STORAGE TANK/FEEDWATER HEATER
21 FEEDWATER PUMPS
22 FEEDWATER HEATERS
23 CONDENSATE PUMPS
24 GLAND STEAM CONDENSER
25 ECONOMIZERS
26 REHEATERS
27 EVAPORATORS
28 SUPERHEATERS
29 EXPANSION TANKS AND CONTAINMENT AREA
30 HTF FREEZE PROTECTION AND WARNUP HEATER (GAS-FIRED)
31 HTF CIRCULATING PUMPS AND CONTAINMENT AREA
32 BLOWDOWN TANK AND SUMP/PUMPS
33 CIRCULATING WATER PUMPS
34 AUXILIARY BOILER
35 GENERATOR CIRCUIT BREAKER
36 MAIN ELECTRICAL ENCLOSURE
37 NOT USED
38 NOT USED
39 ULLAGE SYSTEM AND CONTAINMENT AREA
40 WASTE WATER TANK (250,000 GAL)
41 CLOSED COOLING WATER HEAT EXCHANGERS
42 CLOSED COOLING WATER PUMPS
43 ISOLATED PHASE BUS DUCT
44 NOT USED
45 NOT USED
46 NOT USED
47 FIRE PUMP HOUSE
48 FIRE PROTECTION SPRINKLER HOUSE
49 NOT USED
50 NOT USED
51 10s-START DIESEL GENERATOR
52 ABOVE GROUND DIESEL FUEL STORAGE TANK (3,000 GAL)
53 DIESEL FUEL PUMP
54 WASH TRUCK DEMIN FILL STATION
55 NOT USED
56 STEAM JET AIR INJECTOR
57 NOT USED
58 EXCITATION TRANSFORMER
59 NOT USED
60 TURBINE AREA FLASH TANK
61 LUBE OIL AND EHC SKID
62 OIL/WATER SEPARATOR
63 NOT USED
64 CLOSED COOLING WATER EXPANSION TANK
65 NOT USED
66 NITROGEN BULK STORAGE AND VAPORIZER
67 EQUIPMENT DRAINS SUMP AND PUMPS
68 TREATED WATER PUMP SKID
69 EMERGENCY DIESEL GENERATOR

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009a, Figure 3.4-3

ALTERNATIVES - FIGURE 3

Genesis Solar Energy Project - Gabrych Alternative



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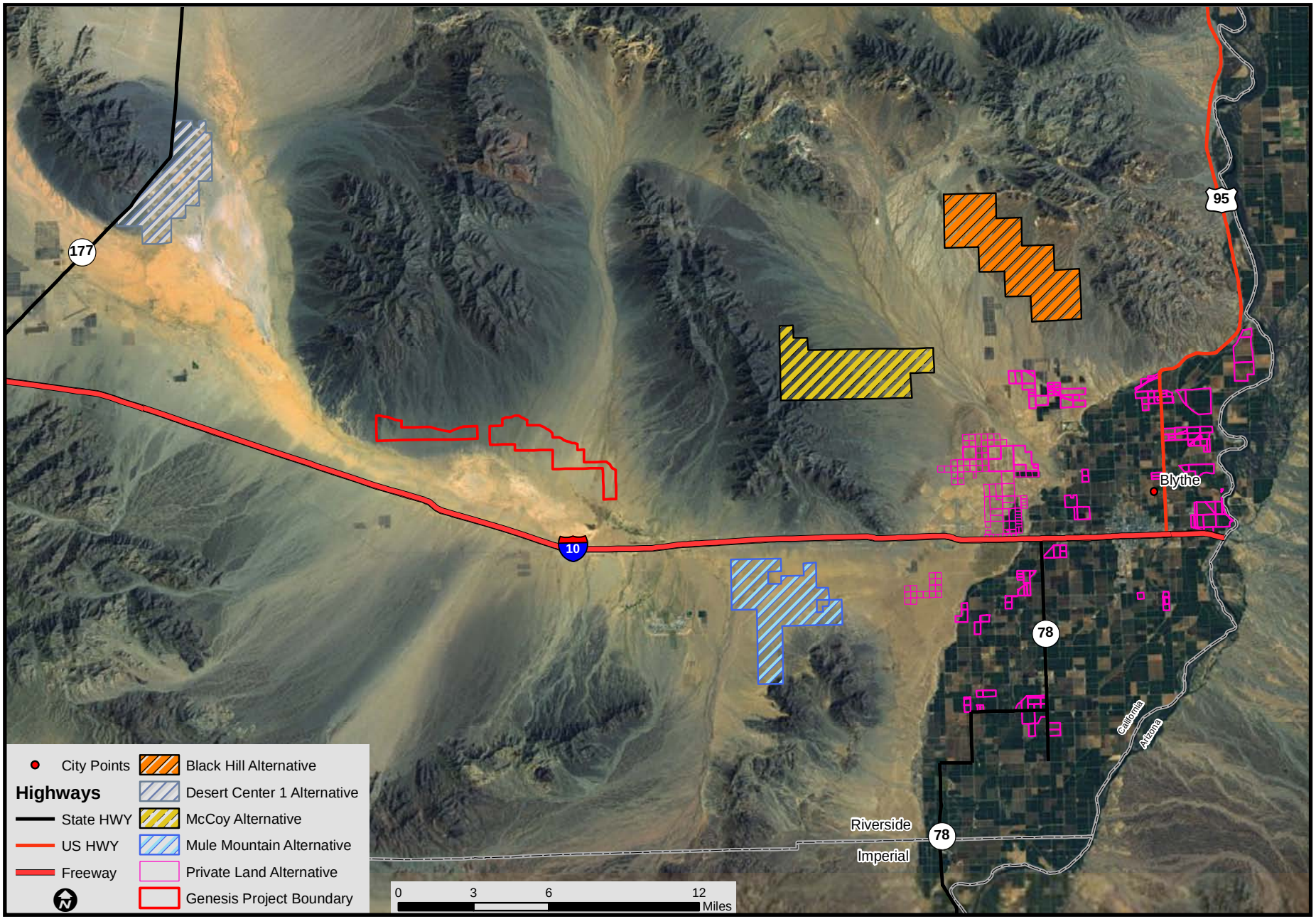
SOURCE: GSEP 2009f

ALTERNATIVES - FIGURE 4

Genesis Solar Energy Project - Alternatives Considered But Not Evaluated in Further Detail



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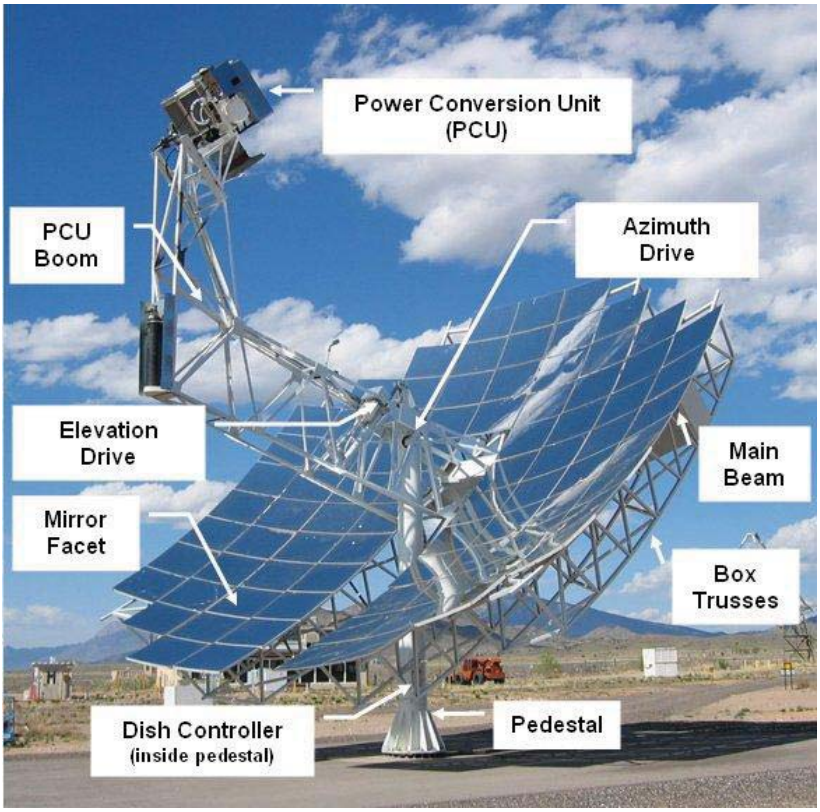
SOURCE: GSEP 2009f

ALTERNATIVES - FIGURE 5

Genesis Solar Energy Project - Solar Generation Technologies



Stirling dish (from Stirling Energy Systems website)

Solar Power Tower (from ISEGS PSA, 2008)

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: Stirling Energy Systems website and ISEGS PSA, 2008

ALTERNATIVES - FIGURE 6

Genesis Solar Energy Project - Linear Fresnel and Photovoltaic Technologies

Linear Fresnel technology
(Wikipedia.org, Fresnel_reflectors_ausra.jpg)

First Solar's thin film solar photovoltaic field
(Photo: Susan Lee)

Canon Solar Partners proposes to use the 35 kW Amonix system
(Canon 2008)

SunPower's PowerTracker Solar in Gwangju City Power Plant, South Korea - 1 MW
http://www.sunpowercorp.com/For-Power-Plants.aspx

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: As listed

B.3 - CUMULATIVE SCENARIO

Testimony of Susan Lee

B.3 CUMULATIVE SCENARIO

B.3.1 INTRODUCTION

Preparation of a cumulative impact analysis is required under CEQA.

Under CEQA Guidelines, “a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts” (14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is “cumulatively considerable” (14 Cal Code Regs §15130(a)). Such incremental effects are to be “viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects” (14 Cal Code Regs §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

CEQA also states that both the severity of impacts and the likelihood of their occurrence are to be reflected in the discussion, “but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion of cumulative impacts shall be guided by standards of practicality and reasonableness, and shall focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact” (14 Cal Code Regs §15130(b)).

B.3.2 RENEWABLE RESOURCES IN CALIFORNIA

A large number of renewable projects have been proposed on BLM managed land, State land, and private land in California. As of January 2010, there were 244 renewable projects proposed in California in various stages of the environmental review process or under construction. As of December 2009, *49* of these projects, representing approximately 10,500 MW, were planning on requesting American Recovery and Reinvestment Act funds from the Federal government. Solar, wind, and geothermal development applications have requested use of BLM land, including approximately one million acres of the California desert. State and private lands have also been targeted for renewable solar and wind projects.

Cumulative Figures 1 and **Cumulative Tables 1A and 1B** illustrate the numerous proposed renewable projects on BLM, State and private land in California. In addition, nearly 80 applications for solar and wind projects are being considered on BLM land in Nevada and Arizona.

Likelihood of Development. The large renewable projects now described in applications to the BLM and on private land are competing for utility Power Purchase Agreements, which will allow utilities to meet state-required Renewable Portfolio Standards. Not all of the projects listed in **Tables 1A** and **1B** will complete the

environmental review, and not all projects will be funded and constructed. It is unlikely that all of these projects will be constructed for the following reasons:

- Not all developers will develop the detailed information necessary to meet BLM and Energy Commission standards. Most of the solar projects with pending applications are proposing generation technologies that have not been implemented at large scales. As a result, preparing complete and detailed plans of development (PODs) is difficult, and completing the required NEPA and CEQA documents is especially time-consuming and costly.
- As part of approval by the appropriate Lead Agency under CEQA and/or NEPA (generally the Energy Commission and/or BLM), all regulatory permits must be obtained by the applicant or the prescriptions required by the regulatory authorities incorporated into the Lead Agency's license, permit or right-of-way grant. The large size of these projects may result in permitting challenges related to endangered species, mitigation measures or requirements, and other issues.
- Also after project approval, construction financing must be obtained (if it has not been obtained earlier in the process). The availability of financing will be dependent on the status of competing projects, the laws and regulations related to renewable project investment, and the time required for obtaining permits.

Incentives for Renewable Development. A number of existing policies and incentives encourage renewable energy development. These incentives lead to a greater number of renewable energy proposals. Examples of incentives for developers to propose renewable energy projects on private and public lands in California, Nevada and Arizona, include the following:

- **U.S. Treasury Department's Payments for Specified Energy Property in Lieu of Tax Credits** under §1603 of the American Recovery and Reinvestment Act of 2009 (Public Law 111-5) - Offers a grant (in lieu of investment tax credit) to receive funding for 30% of their total capital cost at such time as a project achieves commercial operation (currently applies to projects that begin construction by December 31, 2010 and begin commercial operation before January 1, 2017).
- **U.S. Department of Energy (DOE) Loan Guarantee Program** pursuant to §1703 of Title XVII of the Energy Policy Act of 2005 - Offers a loan guarantee that is also a low interest loan to finance up to 80% of the capital cost at an interest rate much lower than conventional financing. The lower interest rate can reduce the cost of financing and the gross project cost on the order of several hundred million dollars over the life of the project, depending on the capital cost of the project.

B.3.3 DEFINITION OF THE CUMULATIVE PROJECT SCENARIO

Cumulative impacts analysis is intended to highlight past actions that are closely related either in time or location to the project being considered, catalogue past projects and discuss how they have harmed the environment, and discuss past actions even if they were undertaken by another agency or another person. Most of the projects listed in the cumulative projects tables (**Cumulative Tables 1A and 1B, 2, and 3** at the end of this section) have, are, or will be required to undergo their own independent environmental review under CEQA.

Under CEQA, there are two acceptable and commonly used methodologies for establishing the cumulative impact setting or scenario: the "list approach" and the "projections approach". The first approach would use a "list of past, present, and probable future projects producing related or cumulative impacts." 14 Cal Code Regs §15130(b)(1)(A). The second approach is to use a "summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact" (14 Cal Code Regs §15130(b)(1)(B)). This Revised Staff Assessment (RSA) uses the "list approach" for purposes of state law to provide a tangible understanding and context for analyzing the potential cumulative effects of a project.

In order to provide a basis for cumulative analysis for each discipline, this section provides information on other projects in both maps and tables. The Energy Commission and the BLM have identified the California desert as the largest area within which cumulative effects should be assessed for all disciplines, as shown in two maps and accompanying tables. However, within the desert region, the specific area of cumulative effect varies by resource. For this reason, each discipline has identified the geographic scope for the discipline's analysis of cumulative impacts. **Cumulative Figures 1 and 2** are on the following pages, and **Cumulative Tables 1, 2, and 3** are presented at the end of this section.

Cumulative Impacts Figure 2 (I-10 Corridor Existing and Future/Foreseeable Projects) and **Tables 2 and 3** define the projects in the immediate vicinity of the I-10 corridor. The area included on these tables consists of an approximate 15 to 20-mile radius around the project site. Table 2 presents existing projects and Table 3 presents future foreseeable projects. Both tables indicate project name, type, location, and status. This data is presented for consideration within each discipline.

B.3.4 APPROACH TO CUMULATIVE IMPACT ANALYSIS

This RSA evaluates cumulative impacts within the analysis of each resource area, following these steps:

1. Define the geographic scope of cumulative impact analysis for each discipline, based on the potential area within which impacts of the Genesis Solar Energy Project could combine with those of other projects.

2. Evaluate the effects of the Genesis Solar Energy Project in combination with <u>past and present</u> (existing) <u>projects</u> within the area of geographic effect defined for each discipline.

3. Evaluate the effects of the Genesis Solar Energy Project with <u>foreseeable future projects</u> that occur within the area of geographic effect defined for each discipline.

Each of these steps is described below.

<u>Geographic Scope of Cumulative Analysis</u>

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 Genesis Solar Energy 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 Genesis Solar Energy Project's schedule. This is a consideration for short-term impacts from the Genesis Solar Energy 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 Genesis Solar Energy Project.

Project Effects in Combination with Foreseeable Future 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 each I-10 corridor project vicinity as illustrated in **Cumulative Impacts – Figure 2 (I-10 Corridor Existing and Future/Foreseeable Projects)** and **Cumulative Impacts Tables 2 (existing projects) and 3 (future/foreseeable projects)**.

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 I-10 corridor 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 and 2**. As shown in the map and table, there are a number of projects in the immediate area around the I-10 corridor whose impacts could combine with those of the proposed project. As shown on **Cumulative Impacts Figure 1** and in **Table 1**, solar and wind development applications for use of BLM land have been submitted for approximately one million acres of the California Desert Conservation Area. Additional BLM land in Nevada and Arizona also has applications for solar and wind projects.

Table 1A. 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
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)

Table 1B. Renewable Energy Projects on State and Private Lands*

Project Name	Location	Status
Solar Projects		
Solargen Panoche Valley Solar Farm (400 MW Solar PV)	San Benito County	EIR in progress
Maricopa Sun Solar Complex (350 MW Solar PV)	Kern County	Information not available
Panoche Ranch Solar Farm (250 MW Solar PV)	Kern County	Information not available
Gray Butte Solar PV (150 MW Solar PV)	Los Angeles County	Information not available
Monte Vista (126 MW Solar PV)	Kern County	Information not available
San Joaquin Solar 1 and 2 (107 MW Solar hybrid)	Fresno	Under environmental review
NRG Alpine Suntower (40 MW solar PV and 46 MW solar thermal)	Los Angeles	Information not available
Palmdale Hybrid Power Project Unit 1 (50 MW solar thermal, part of a hybrid project)	City of Palmdale	Under environmental review
Lucerne Valley Solar (50 MW solar PV)	San Bernardino	Under environmental review
Lost Hills (32.5 solar PV)	Kern County	Information not available
Tehachapi Photovoltaic Project (20 MW solar PV)	Kern County	Information not available
Sun City Project Phase 1 (20 MW solar PV)	Kings County	Information not available
Boulevard Associates (20 MW solar PV)	San Bernardino County	Information not available
Stanislaus Solar Project I (20 MW solar PV)	Stanislaus County	Information not available
Stanislaus Solar Project II (20 MW solar PV)	Stanislaus County	Information not available
Synapse Solar 2 (20 MW solar PV/solar thermal)	Kings	Information not available
T, squared, Inc. (19 MW solar PV)	Kern County	Information not available
Rancho Seco Solar Thermal (15-17 MW solar trough)	Sacramento County	Information not available
Global Real Estate Investment Partners, LLC (solar PV)	Kern County	Information not available
Recurrent Energy (solar PV)	Kern County	Information not available
Man-Wei Solar (solar PV)	Kern County	Information not available
Regenesis Power for Kern County Airports Dept.	Kern County	Information not available
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
Bethel Solar Hybrid Power Plant (49.4 MW hybrid solar thermal and biomass)	Seeley, Imperial County	Under environmental review

Project Name	Location	Status
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
City of Vernon Wind Energy Project (300 MW)	City of Vernon	Information not available
Manzana Wind Project (246 MW)	Kern County	Information not available
Iberdrola Tule Wind (200 MW)	San Diego County, McCain Valley	EIR/EIS in progress
Padoma Wind Energy (175 MW)	Shasta County	Information not available
Pine Canyon (150 MW)	Kern County	Information not available
Shiloh III (200 MW)	Montezuma Hills, Solano County	Information not available
AES Daggett Ridge (84 MW)	San Bernardino	EIS in progress
Granite Wind, LLC (81 MW)	San Bernardino	EIR/EIS in progress
Bear River Ridge (70 MW)	Humboldt County	Information not available
Aero Tehachapi (65 MW)	Kern County	Information not available
Montezuma Wind II (52-60)	Montezuma Hills, Solano County	Information not available
Tres Vaqueros (42 MW wind repower)	Contra Costa County	Information not available
Montezuma Hills Wind Project (34-37 MW)	Solano County	Information not available
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	Information not available
Black Rock Geothermal 1,2,and 3	Imperial County	Information not available

* This list is compiled from the projects on CEQAnet as of November 2009 and the projects located on private or State lands that are listed on the Energy Commission Renewable Action Team website as requesting ARRA funding. Additional renewable projects proposed on private and State lands but not requesting ARRA funds are listed on the website.

Source: CEQAnet [http://www.ceqanet.ca.gov/ProjectList.asp], November 2009 and CEC Renewable Action Team – Generation Tracking for ARRA Projects 12/29/2009 [http://www.energy.ca.gov/33by2020/documents/2009-12-29/2009-12-29_Proposed_ARRA_Renewable_Projects.pdf]Table 2. Existing Projects along the I-10 Corridor (Eastern Riverside County)

ID #	Project Name; Agency ID	Location	Ownership	Status	Acres	Project Description
1	Interstate 10	Linear project running from Santa Monica to Blythe (in California)	Caltrans	Existing	N/A	Interstate 10 (I-10) is a major east-west route for trucks delivering goods to and from California. It is a four lane divided highway in the Blythe region.
2	Chuckwalla Valley State Prison	19025 Wiley's Well Rd. Blythe, CA	CA Dept. of Corrections & Rehabilitation	Existing	1,080	State prison providing long-term housing and services for male felons classified as medium and low-medium custody inmates jointly located on 1,720 acres of State-owned property. APN 879040006,008, 012, 027, 028, 029, 030,
3	Ironwood State Prison	19005 Wiley's Well Rd. Blythe, CA	CA Dept. of Corrections & Rehabilitation	Existing	640	ISP jointly occupies with Chuckwalla Valley State Prison 1,720 acres of State-owned property, of which ISP encompasses 640 acres. The prison complex occupies approximately 350 acres with the remaining acreage used for erosion control, drainage ditches, and catch basins. 879040001, 004, 009, 010, 011, 015, 016, 017, 018, 019, 020
4	Devers-Palo Verde Transmission Line	From the Midpoint Substation to Devers Substation	SCE	Existing	N/A	Existing 500 kV transmission line parallel to I-10 from Midpoint Substation, approximately 10 miles southwest of Blythe, to the SCE Devers Substation, near Palm Springs.
5	Blythe Energy Project	City of Blythe, north of I-10, 7 miles west of the CA/AZ border	Blythe Energy, LLC	Existing	76	520 MW combined-cycle natural gas-fired electric-generating facility. Project is connected to the Buck Substation owned by WAPA.
6	West-wide Section 368 Energy Corridors	Riverside County, parallel to DPV corridor	BLM, DOE, U.S. Forest Service	Approved by BLM and U.S. Forest Service	N/A	Designation of corridors on federal land in the 11 western states, including California, for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors). One of the corridors runs along the southern portion of Riverside County.
7	Eagle Mountain Pumping Plant	Eagle Mountain Road, west of Desert Center	Metropolitan Water District of Southern California	Existing		144 ft. pumping plant that is part of the Metropolitan Water District of Southern California's facilities. APNs 807150007, 807150009, 807150010
8	Recreational Opportunities	Eastern Riverside County	BLM	Existing	N/A	BLM has numerous recreational opportunities on lands in eastern Riverside County along the I-10 corridor including the Wiley's Well Campground, Coon Hollow Campground, and Midland Long-Term Visitor Area.
9	Kaiser Mine	Eagle Mountain, north of Desert Center	Kaiser Ventures, Inc.	Mining activities stopped in 1983.		Kaiser Steel mined iron ore at Kaiser Mine in Eagle Mountain and provided much of the Pacific Coast steel in the 1950s. Mining project also included the Eagle Mountain Railroad, 51 miles long. Imported steel captured market share in the 1960s and 1970s and primary steelmaking closed in the 1980s. 701380031

Table 3. Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)						
ID #	Project Name; Agency ID	Location	Ownership	Status	Acres	Project Description
A	Four Commercial Projects	Blythe, CA	Various	Approved	N/A	Four commercial projects have been approved by the Blythe Planning Department including the Agate Road Boat & RV Storage, Riverway Ranch Specific Plan, Subway Restaurant and Motel, and Agate Senior Housing Development.
B	Intake Shell	Blythe, CA		Under Construction	N/A	Reconstruction of a Shell facility located at Intake & Hobsonway. Demolition occurred in 2008, reconstruction planned for 2009-2010.
C	Fifteen Residential Developments	Blythe, CA	Various	Approved/Under Construction	N/A	Twelve residential development projects have been approved by the Blythe Planning Department including: Vista Palo Verde (83 Single Family Residential [SFR]), Van Weelden (184 SFR), Sonora South (43 SFR), Ranchette Estates (20 SFR), Irvine Assets (107 SFR), Chanslor Village (79 SFR), St. Joseph's Investments (69 SFR), Edgewater Lane (SFR), The Chanslor Place Phase IV (57 SFR), Cottonwood Meadows (103 Attached SFR), Palo Verde Oasis Phase IV (29 SFR). Three residential development projects have been approved and are under construction including: The Chanslor Phase II & III (78 SFR), River Estate at Hidden Beaches, Mesa Bluffs Villas (26 Attached SFR).
D	Devers-Palo Verde 2 Transmission Line Project	From the Midpoint Substation to Devers Substation	SCE	Project was approved by CPUC 11/2009.	N/A	New 500 kV transmission line parallel to the existing Devers-Palo Verde Transmission Line from Midpoint Substation, approximately 10 miles southwest of Blythe, to the SCE Devers Substation, near Palm Springs. The ROW for the 500 kV transmission line would be adjacent to the existing DPV ROW and would require an additional 130 feet of ROW on federal and State land and at least 130 feet of ROW on private land and Indian Reservation land.
E	Colorado Substation	10 miles southwest of Barstow	SCE	Project was approved by CPUC 11/2009.	44	The new 500/230 kV substation would be constructed within a rectangular area approximately 1,000 feet by 1,900 feet, resulting in approximately 44 acres permanently disturbed. The 500 kV switching station would include buses, circuit breakers, and disconnect switches. The switchyard would be equipped with 108-foot-high dead-end structures. Outdoor night lighting would be designed to illuminate the switchrack when manually switched on.
F	Blythe Energy Project Transmission Line	From the Blythe Energy Project (Blythe, CA) to Devers Substation	Blythe Energy, LLC	Under construction	N/A	Transmission Line Modifications including upgrades to Buck Substation, approximately 67.4 miles of new 230 kV transmission line between Buck Substation and Julian Hinds Substation, upgrades to the Julian Hinds Substation, installation of 6.7 miles of new 230 kV transmission line between Buck Substation and SCE's DPV 500 kV transmission line.

Table 3. Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)						
ID #	Project Name; Agency ID	Location	Ownership	Status	Acres	Project Description
G	Desert Southwest Transmission Line	118 miles primarily parallel to DPV	Imperial Irrigation District	Final EIR prepared 2005. Approved by the BLM in 2006.	N/A	New, approximately 118-mile 500 kV transmission line from a new substation/switching station near the Blythe Energy Project to the existing Devers Substation located approximately 10 miles north of Palm Springs, California.
H	Green Energy Express Transmission Line Project	70-mile transmission line from the Eagle Mountain Substation to southern California	Green Energy Express LLC	September 9, 2009, Green Energy Express LLC filed a Petition for Declaratory Order requesting that FERC approve certain rate incentives for the project	N/A	70-mile double-circuit 500 kV transmission line and new 500/230 kV substation from near the Eagle Mountain Substation (eastern Riverside County) to Southern California
I	Blythe Energy Project II	Blythe, CA. Near the Blythe Airport and I-10	Blythe Energy, LLC	Approved December 2005	30 acres (located on Blythe Energy Project land)	520 MW combined-cycle power plant located entirely within the Blythe Energy Project site boundary. Blythe Energy Project II will interconnect with the Buck Substation constructed by WAPA as part of the Blythe Energy Project. Project is designed on 30 acres of a 76-acre site.
J	Eagle Mountain Pumped Storage Project	Eagle Mountain iron ore mine, north of Desert Center	Eagle Crest Energy Company	License application filed with FERC in June 2009	1,524	1,300 MW pumped storage project designed to store off-peak energy to utilize during on-peak hours. The captured off-peak energy will be used to pump water to an upper reservoir where the energy will be stored. The water will then be released to a lower reservoir through an underground electrical generating facility where the stored energy will be released back into the Southwestern grid during "high demand peak" times, primarily weekdays. Estimated water use is 8,100 AFY for the first four-year start-up period and replacement water is 1,763 AFY thereafter. 1
K	Palen Solar Power Project	North of I-10, 10 miles east of Desert Center	Solar Millennium LLC/Chevron Energy	Undergoing environmental review, construction to begin end of 2010 with one unit online in 2012 and one unit online in 2013.	5,200	500 MW solar trough project on 5,200 acres. Facility would consist of two 250 MW plants. Approximately 3,870 acres would be disturbed. Project would include interconnection to the SCE Red Bluff Substation. Project would use 300 AFY.
L	Blythe Solar Power Project	North of I-10, immediately north of the Blythe Airport	Solar Millennium LLC/Chevron Energy	Undergoing environmental review	9,400	1,000 MW solar trough facility on 9,400 acres

Table 3. Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)						
ID #	Project Name; Agency ID	Location	Ownership	Status	Acres	Project Description
M	NextEra (FPL) McCoy	Northwest of Blythe, CA, immediately north of Blythe Solar Power Project	NextEra (FPL)	Plan of Development in to Palm Springs BLM	20,608	250 MW solar trough project. ROW in process for monitoring water well drilling.
N	McCoy Soleil Project	10 miles northwest of Blythe	enXco	Plan of Development in to Palm Springs BLM	1,959	300 MW solar power tower project located on 1,959 acres. Project would require a 14 mile transmission line to proposed SCE Colorado Substation south of I-10. Would use 575-600 AFY.
O	Genesis Solar Energy Project	North of I-10, 25 miles west of Blythe and 27 miles east of Desert Center	NextEra (FPL)	Undergoing environmental review. Construction to begin at the end of 2010.		250 MW solar trough project located on 4,640 acres north of the Ford Dry Lake. Project includes six mile natural gas pipeline and a 5.5 mile gen-tie line to the Blythe Energy Center to Julian Hinds Transmission Line, then travel east on shared transmission poles to the Colorado River Substation.
P	Big Maria Vista Solar Project	North of I-10, approximately 12 miles northwest of Blythe	Bullfrog Green Energy	Plan of Development submitted to BLM	2,684	500 MW solar photovoltaic project on 2,684 acres of land. Project would be built in three phases and would require 6,000 gallons of water monthly.
Q	Chuckwalla Solar I	1 mile north of Desert Center	Chuckwalla Solar I, LLC	Plan of Development submitted to BLM	4,083	200 MW solar photovoltaic project on 4,083 acres of land. Project would be developed in several phases and would tap into an existing SCE 161-kV transmission line crossing the site.
R	Rice Solar Energy Project	Rice Valley, Eastern Riverside County	Rice Solar Energy, LLC (SolarReserve, LLC)	Undergoing environmental review. Construction to begin in 2011	1,410	150 MW solar power tower project with liquid salt storage. Project is located on approximately 1,410 acres and includes a power tower approximately 650 feet tall and a 10-mile long interconnection with the WAPA Parker-Blythe transmission line.
S	Blythe Airport Solar I Project	Blythe Airport	U.S. Solar	Application has been submitted to City of Blythe, City of Blythe approved the project in November, 2009	640	100 MW solar photovoltaic project located on 640 acres of Blythe airport land.
T	Blythe PV Project	Blythe	First Solar	CPUC approved project terms of a 20 year power purchase agreement for sale of 7.5 MW, Under construction in forth quarter, 2009	200	7.5 MW solar photovoltaic project located on 200 acres. Project was constructed by First Solar and sold to NRG Energy.
U	Desert Quartzite	South of I-10, 8 miles southwest of Blythe	First Solar (previously OptiSolar)	POD in to BLM	7,724	600 MW solar photovoltaic project located on 7,724 acres. Adjacent to DPV transmission line and SCE Colorado Substation. Approximately 27 AF would be used during construction and 3.8 AFY during operation.

Table 3. Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)						
ID #	Project Name; Agency ID	Location	Ownership	Status	Acres	Project Description
V	Desert Sunlight	North of Desert Center	First Solar (previously OptiSolar)	POD in to BLM	5,000-6,000	250 MW solar photovoltaic project located on 5,000-6,000 acres. Project would tie into the SCE Red Bluff Substation. Approximately 27 AF would be used during construction and 3.8 AFY during operation.
W	EnXco	North of Wileys Well Road, east of Genesis Solar Energy Project	enXco	POD in to BLM		300 MW solar photovoltaic project location on X acres.
X	Desert Lily Soleil Project	6 miles north of Desert Center	enXco		1,216	100 MW photovoltaic plant on 1,216 acres of BLM land. Would require a 5-8 mile transmission line to planned SCE Red Bluff Substation.
Y	Red Bluff Substation	Unknown at this time – near Desert Center	SCE		N/A	Proposed 230/500 kV Substation near Desert Center. Planned to interconnect renewable projects near Desert Center with the DPV transmission line.
Z	Chuckwalla Valley Raceway	Desert Center Airport (no longer a functioning airport)	Developer Matt Johnson	Under construction, track expected to be open in mid 2010	400	Proposed 500-mile race track located on 400 acres of land that used to belong to Riverside County and was used as the Desert Center airport. APN 811142016, 811142006
AA	Eagle Mountain Landfill Project	Eagle Mountain, North of Desert Center	Mine Reclamation Corporation and Kaiser Eagle Mountain, Inc.	U.S. Court of Appeals for the Ninth Circuit issued its regarding the EIS for the project in 11/09 and ruled that the land exchange for the project was not properly approved by the administrative agency. Kaiser's Mine and Reclamation is considering all available options.	~ 3,500	The project proposed to develop the project on a portion of the Kaiser Eagle Mountain Mine in Riverside County, California. The proposed project comprises a Class III nonhazardous municipal solid waste landfill and the renovation and repopulation of Eagle Mountain Townsite. The proposal by the proponent includes a land exchange and application for rights-of-way with the Bureau of Land Management and a Specific Plan, General Plan Amendment, Change of Zone, Development Agreement, Revised Permit to Reclamation Plan, and Tentative Tract Map with the County.The Eagle Mountain landfill project is proposed to accept up to 20,000 tons of non-hazardous solid waste per day for 50 years.
AB	Wileys Well Communication Tower (part of the Public Safety Enterprise Communication System)	East of Wileys Well Road, just south of I-10	Riverside County	Final EIR for the Public Safety Enterprise Communication System published in August 2008.	N/A	The Public Safety Enterprise Communication project is the expansion of the County of Riverside's fire and law enforcement agencies approximately 20 communication sites to provide voice and data transmission capabilities to assigned personnel in the field.

Table 3. Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)						
ID #	Project Name; Agency ID	Location	Ownership	Status	Acres	Project Description
A C	Mule Mountain Solar Project	South of I-10, approximately 4 miles west of Blythe	Bullfrog Green Energy	Plan of Development in to Palm Springs BLM	2,684	500 MW solar concentrating photovoltaic project located on 2,684 acres. Considering interconnection with proposed SCE Colorado Substation. Approximately 6,000 gallons of water would be required monthly.
Additional Projects Outside Cumulative Figure Boundaries						
	Paradise Valley "New Town" Development	Approximately 30 miles west of Desert Center (7 miles east of the city of Coachella)	Glorious Land Company	Notice of Preparation of an EIR published in December of 2005. Still under environmental review.	6,397	Company proposed to develop a planned community as an international resort destination with residential, recreational, commercial, and institutional uses and facilities. The project is planned as a self-contained community with all public and quasi-public services provided. The project is located outside the Coachella Valley Water District (CVWD) boundaries and the applicant has entered into an agreement with the CVWD to manage artificial recharge of the Shaver's Valley groundwater. The proponent has purchased a firm water supply from Rosedale-Rio Bravo Water District in Kern County. In-kind water will be transferred to the MWD which will release water from the Colorado River Aqueduct to a 38 acre percolation pond on the project site. The MWD will deliver approximately 10,000 AFY to the percolation pond and over the long term, no net loss of groundwater in storage is anticipated.
	Proposed National Monument (former Catellus Lands)	Between Joshua Tree National Park and Mojave National Preserve		In December 2009, Senator Feinstein introduced bill S.2921 that would designate two new national monuments including the Mojave Trails National Monument.	941,000 acres	The proposed Mojave Trails National Monument would protect approximately 941,000 acres of federal land, including approximately 266,000 acres of the former railroad lands along historic Route 66. The BLM would be given the authority to conserve the monument lands and also to maintain existing recreational uses, including hunting, vehicular travel on open roads and trails, camping, horseback riding and rockhounding.
	BLM Renewable Energy Study Areas	Along the I-10 corridor between Desert Center and Blythe	BLM	Proposed		The DOE and BLM identified 24 tracts of land as Solar Energy Study Areas in the BLM and DOE Solar PEIS. These areas have been identified for in-depth study of solar development and may be found appropriate for designation as solar energy zones in the future.
	Solar Energy projects along Arizona Border	Approximately 15 miles east of the CA/ AZ border along I-10 corridor	Various	Applications filed in to Arizona BLM field offices, application status listed as pending.		Five solar trough and solar power tower projects have been proposed along the I-10 corridor approximately 15 miles east of the CA/AZ border. The projects have been proposed on BLM administered-land in the Yuma and Kingman Field Offices and have requested use of approximately 75,000 acres.

1. Water usage for the Eagle Mountain Pumped Storage Project was based on the information provided to FERC by the Eagle Crest Energy Company in the Responses to Deficiency of License Application and Additional Information Request dated October 26, 2009.

REFERENCES

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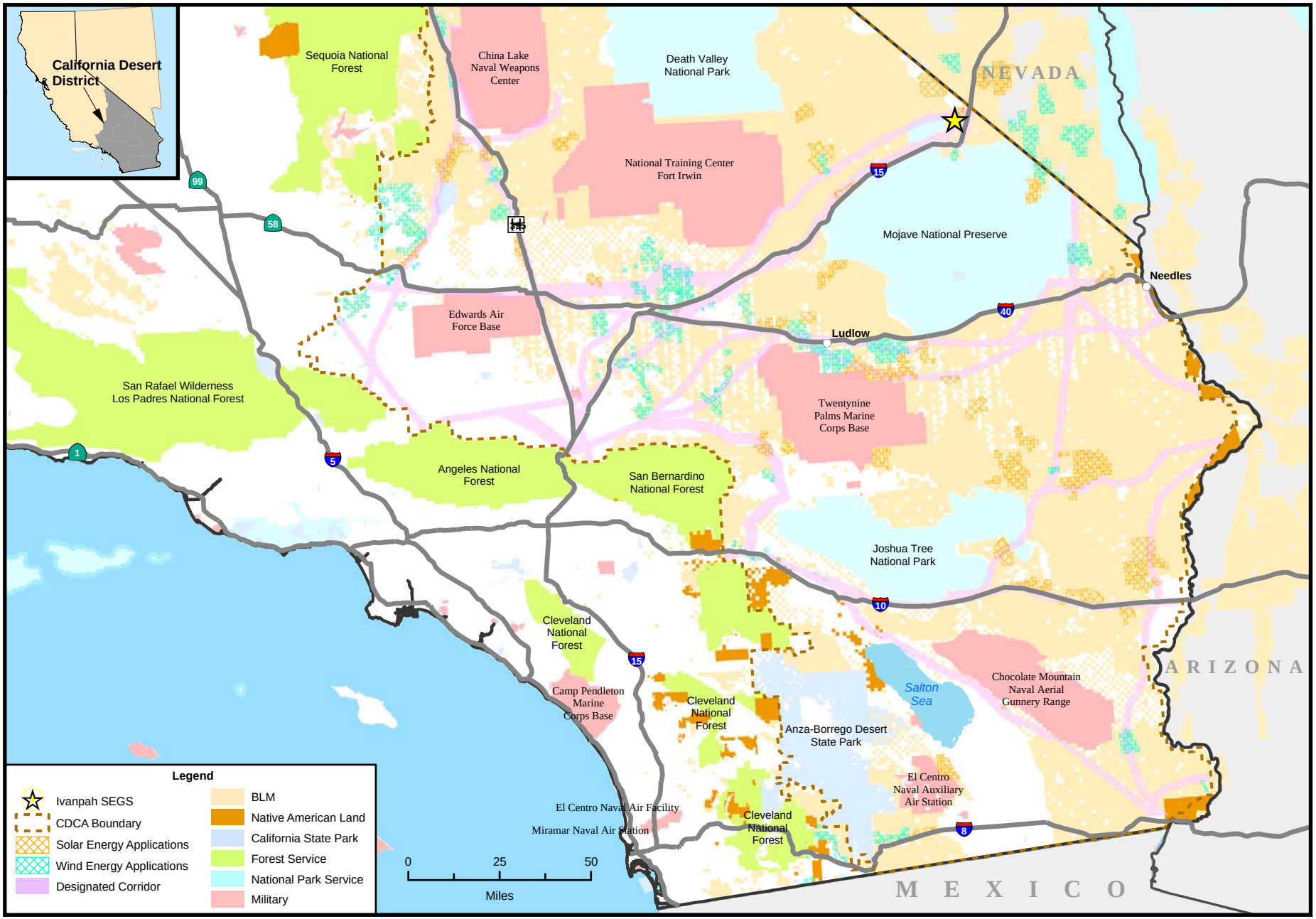
CUMULATIVE IMPACTS - FIGURE 1

Genesis Solar - Regional Renewable Applications

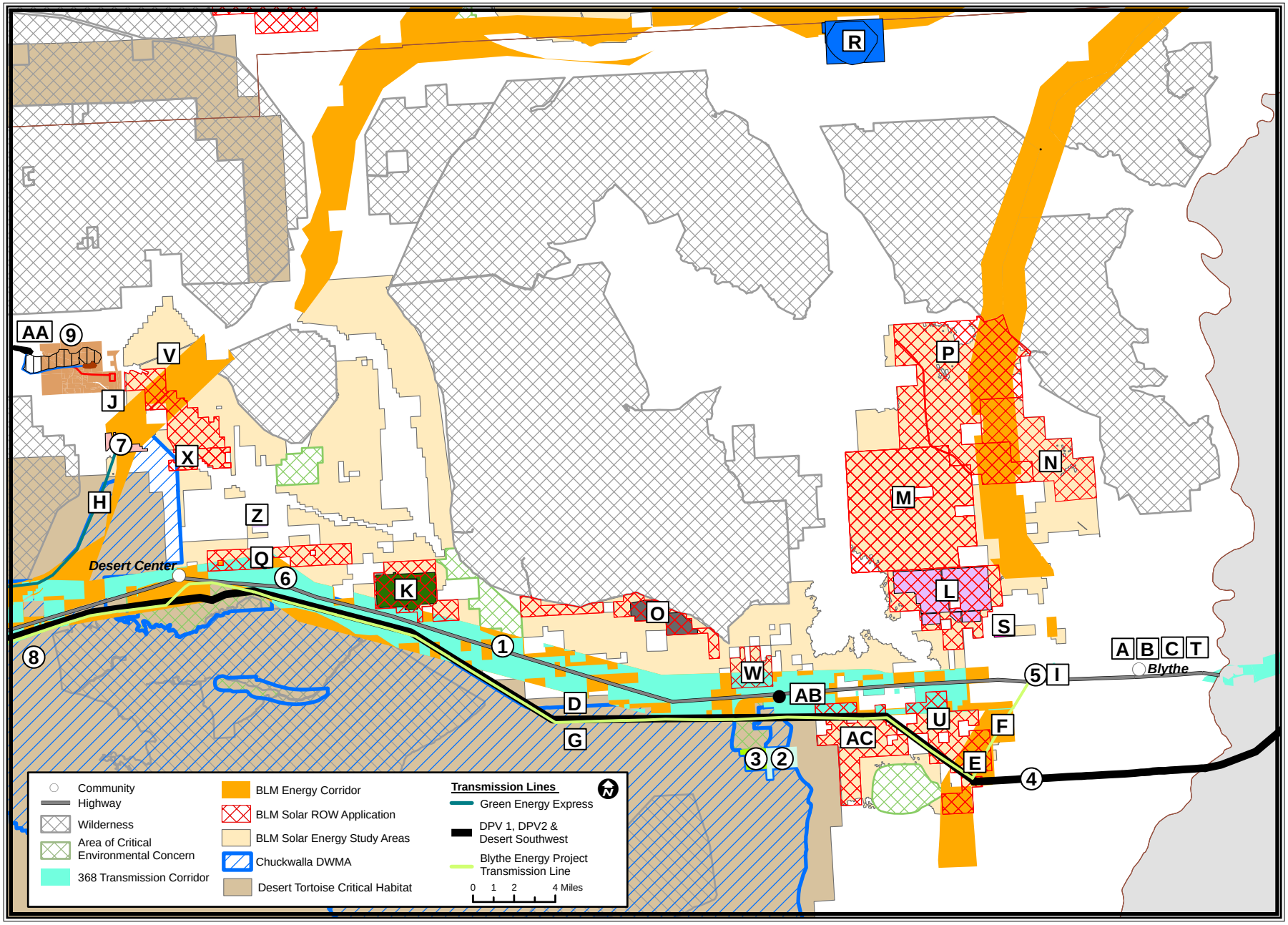


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: California Energy Commission

CUMULATIVE IMPACTS - FIGURE 2

Genesis Solar - Existing and Future/Foreseeable Projects



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: California Energy Commission, Bureau of Land Management

C. ENVIRONMENTAL ANALYSIS

C.1 - AIR QUALITY

Testimony of Joseph Hughes and William Walters, P.E.

C.1.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff[1] (hereinafter referred to as "staff") find that with the adoption of the attached conditions of certification the proposed Genesis Solar Energy Project would comply with all applicable laws, ordinances, regulations, and standards and would not result in any significant California Environmental Quality Act air quality impacts. These Conditions of Certification meet the Energy Commission's responsibility to comply with the California Environmental Quality Act and Bureau of Land Management's responsibility to comply with the National Environmental Policy Act.

Staff have concluded that the proposed project would not have the potential to exceed Prevention of Significant Deterioration emission threshold levels during direct source operation and the facility is not considered a major stationary source with potential to cause adverse National Environmental Policy Act air quality impacts. However, without adequate control, the fugitive dust emissions from construction would have the potential to exceed Prevention of Significant Deterioration particulate emission threshold levels. This potential exceedance of a federal air quality emission threshold would be considered a direct, adverse impact under National Environmental Policy Act. This impact would be less than adverse with the proposed mitigation measures controlling fugitive dust emissions during construction.

The Genesis Solar Energy Project would emit substantially lower greenhouse gas[2] emissions per megawatt-hour than fossil fueled generation resources in California. The Genesis Solar Energy Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

C.1.2 INTRODUCTION

Genesis Solar, LLC (hereinafter referred to as the applicant) submitted an Application for Certification (AFC) to construct and operate a solar power plant in Riverside County, California. The proposed project's power block and solar arrays would occupy approximately 1,360 acres of the 1,800-acre project site that would be within a 4,640 right of way grant applied for with the BLM. Additionally, evaporation ponds, an access road, administration buildings and other support facilities, land treatment unit (LTU), and

[1] This analysis has been completed solely by Energy Commission staff and only reflects the findings and recommendations of Energy Commission staff. BLM will complete a separate Final Environmental Impact Statement for this project and the official federal findings and recommended mitigation measures will be provided in that document.

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

some open areas would be fenced for a total of 1,800 acres. The project site is located in an undeveloped area of Riverside County, approximately 25 miles west of Blythe, California and 27 miles east of Desert Center, California. Surrounding features include the McCoy Mountains to the east, the Palen Mountains (including the Palen/McCoy Wilderness Area) to the north, and Ford Dry Lake, a dry lakebed, to the south. Interstate 10 (I-10) is located approximately two miles south of the southernmost border of the Project site.

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the Genesis Solar Energy Power Project (GSEP or proposed project). Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established ambient air quality standards to protect public health.

The criteria pollutants analyzed within this section are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and particulate matter (PM). Lead is not analyzed as a criteria pollutant, but lead and other toxic air pollutant emissions impacts are analyzed in the Public Health Section of this Staff Assessment (SA). Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter, or PM10) and fine particulate matter (less than 2.5 microns in diameter, or PM2.5). Nitrogen oxides (NOx, consisting primarily of nitric oxide [NO] and NO_2) and volatile organic compounds (VOC) emissions readily react in the atmosphere as precursors to ozone and, to a lesser extent, particulate matter. Sulfur oxides (SOx) readily react in the atmosphere to form particulate matter and are major contributors to acid rain. Global climate change and greenhouse gas (GHG) emissions from the proposed project are discussed in an **Appendix Air-1** and analyzed in the context of cumulative impacts.

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

- whether GSEP is likely to conform with applicable federal, state, and Mojave Desert Air Quality Management District (MDAQMD or District) air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1744 (b));
- whether GSEP is likely to cause new violations of ambient air quality standards or contribute substantially to existing violations of those standards (Title 20, California Code of Regulations, section 1743);
- whether mitigation measures proposed for GSEP are adequate to lessen potential impacts under the California Environmental Quality Act (CEQA) to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)); and

C.1.3 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 use jurisdictions of the

California Energy Commission and U.S. Bureau of Land Management (BLM). This document is intended to meet the requirements of CEQA. The methodology used for determining environmental impacts of the proposed project includes a consideration of CEQA guidance. A significant impact is defined under CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (Cal.Code Regs., tit.14 [hereinafter CEQA Guidelines] Section 15382). Questions used in evaluating significance of air quality impacts are based on Appendix G of the CEQA Guidelines (CCR 2006). The specific approach used by Commission staff in determining CEQA significance is discussed in more detail below.

C.1.3.1 LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

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

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

Applicable LORS	Description
Federal	
40 Code of Federal Regulations (CFR) Part 52	Nonattainment New Source Review (NSR) requires a permit and requires Best Available Control Technology (BACT) and Offsets. Permitting and enforcement delegated to MDAQMD. Prevention of Significant Deterioration (PSD) requires major sources or major modifications to major sources to obtain permits for attainment pollutants. GSEP is a new source that does not have a rule listed emission source thus the PSD trigger levels are 250 tons per year for NOx, VOC, SO_2, PM2.5 and CO.
40 CFR Part 60	New Source Performance Standards (NSPS), Subpart Dc Standards of Performance for Small Industrial-Commercial-Institutional Steam Generation Units. Establishes recordkeeping and reporting requirements for natural gas fired steam generating units. Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Establishes emission standards for compressions ignition internal combustion engines, including emergency generator and fire water pump engines.
40 CFR Part 93 General Conformity	Requires determination of conformity with State Implementation Plan for Projects requiring federal approvals if project annual emissions are above specified levels.
State	
Health and Safety Code (HSC) Section 40910-40930	Permitting of source needs to be consistent with Air Resource Board (ARB) approved Clean Air Plans.
HSC Section 41700	Restricts emissions that would cause nuisance or injury.
California Code of Regulations (CCR) Section 93115	Airborne Toxics Control Measure for Stationary Compression Ignition Engines. Limits the types of fuels allowed, established maximum emission rates, establishes recordkeeping requirements on stationary compression ignition engines, including emergency generator and fire water pump engines.
Local (Mojave Desert Air Quality Management District)	
Rule 201 and 203 Permits Required	Requires a Permit to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutant without first obtaining a permit to operate.
Rules 401, 402, and 403 Nuisance, Visible Emissions, Fugitive Dust	Limits the visible, nuisance, and fugitive dust emissions and would be applicable to the construction period of the project.
Rule 404 Particulate Matter - Concentration	Limits the particulate matter concentration from stationary source exhausts.
Rule 406 Specific Contaminants	The rule prohibits sulfur compound emissions in excess of 500 ppmv.
Rule 407 Liquid and Gaseous Air Contaminants	The rule prohibits carbon monoxide emissions in excess of 2,000 ppmv.
Rule 409 Combustion Contaminants	Limits the emissions from fossil fuel combustion.
Rule 431 Sulfur Content of Fuels	Limits the sulfur content of liquid fuels to no more than 0.5 percent by weight.
Rule 900 Standard of Performance for New Stationary Source	Incorporates the Federal NSPS (40 CFR 60) rules by reference.
Rule 1303 New Source Review	Specifies BACT/Offsets technology and requirements for a new emissions unit that has potential to emit any regulated pollutants.

Applicable LORS	Description
Rule 1306 Electric Energy Generating Facilities	Describes actions to be taken for permitting of power plants that are within the jurisdiction of the Energy Commission.

C.1.3.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff assesses four kinds of primary and secondary[3] impacts: construction, operation, closure and decommissioning, and cumulative. Construction impacts result from the onsite and offsite emissions occurring during site preparation and construction of the proposed project. Operational impacts result from the emissions of the proposed project during operation, which includes all of the onsite auxiliary equipment emissions (boilers, cooling towers, emergency engines, etc.), the onsite maintenance vehicle emissions, and the offsite employee and material delivery trip emissions. Closure and decommissioning impacts occur from the onsite and offsite emissions that would result from dismantling the facility and restoring the site. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time, together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065(c), 15130, and 15355.)

C.1.3.3 METHOD AND THRESHOLD FOR DETERMINING CEQA SIGNIFICANCE

CEC staff evaluates potential impacts per Appendix G of the CEQA Guidelines (CCR 2006) as appropriate for the project. A CEQA significant adverse impact is determined to occur if potentially significant CEQA impacts cannot be mitigated appropriately through the adoption of Conditions of Certification. Specifically, Energy Commission staff uses health-based ambient air quality standards (AAQS) established by the ARB and the U.S.EPA as a basis for determining whether a project's emissions will cause a significant adverse impact under CEQA. The standards are set at levels that include a margin of safety and are designed to adequately protect the health of all members of the public, including those most sensitive to adverse air quality impacts such as the aged, people with existing illnesses, children, and infants. Staff evaluates the potential for significant adverse air quality impacts by assessing whether the project's emissions of criteria pollutants and their precursors (NOx, VOC, PM10 and SO_2) could create a new AAQS exceedance (emission concentrations above the standard), or substantially contributes to an existing AAQS exceedance.

Staff evaluates both direct and cumulative impacts. Staff will find that a project or activity will create a direct adverse impact when it causes an exceedance of an AAQS. Staff will find that a project's effects are cumulatively considerable when the project emissions in conjunction with ambient background, or in conjunction with reasonably

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

foreseeable future projects, substantially contribute to ongoing exceedances of an AAQS. Factors considered in determining whether contributions to ongoing exceedences are substantial include:

1. the duration of the activity causing adverse air quality impacts;

2. the magnitude of the project emissions, and their contribution to the air basin's emission inventory and future emission budgets established to maintain or attain compliance with AAQS;

3. the location of the project site, i.e., whether it is located in an area with generally good air quality where non-attainment of any ambient air quality standard is primarily or solely due to pollutant transport from other air basins;

4. the meteorological conditions and timing of the project impacts, i.e., do the project's maximum modeled pollutant impacts occur when ambient concentrations are high (such as during high wind periods, or seasonally);

5. the modeling methods, and how refined or conservative the impact analysis modeling methods and assumptions were and how that may affect the determined adverse impacts;

6. the project site location and nearest receptor locations; and whether the identified adverse impacts would also occur at the maximum impacted receptor location; and,

7. potential for future cumulative impacts; and whether appropriate mitigation is being recommended to address the potential for impacts associated with likely future projects.

C.1.3.4 IMPACTS FROM CLOSURE AND DECOMMISSIONING

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

C.1.4 PROPOSED PROJECT

C.1.4.1 SETTING AND EXISTING CONDITIONS

Climate and Meteorology

The project site is located 25 miles to the west of Blythe, California within the eastern portion of Riverside County in the Mojave Desert Air Basin (MDAB). This area surrounding the project site has a typical desert climate characterized by low precipitation, hot summers, mild winters, low humidity, and strong temperature inversions. Total rainfall in Blythe averages just less than four inches per year with about 50 percent of the total rainfall occurring during the December through March winter rainy season, and about 30 percent occurring during the August/September summer monsoon season (WC 2009).

The highest monthly average high temperature in Blythe is 109°F in July and the lowest average monthly low temperature is 39°F in December (WC 2009). The applicant provided wind roses from the Blythe Airport Automated Surface Observing System (ASOS) for the years 2002 to 2006. This wind data indicates the highest annual wind direction frequencies are from the south through the southwest. Quarterly tables show prevailing winds from the south for spring and summer and from the northwest for fall and winter. Calm conditions occur approximately 16 percent of the time, and the annual average wind speed is approximately 7.6 miles per hour (mph). Due to the topography of the particular site, staff would expect a more westerly wind direction.

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 a two mile radius of the site center. The Ironwood and Chuckwalla State Prisons (adjacent to each other) are located approximately nine miles to the south of the Project site.

Existing Ambient Air Quality

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

Air Quality Table 2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 ppm[a] (147 µg/m^3)	0.070 ppm (137 µg/m^3)
	1 Hour	—	0.09 ppm (180 µg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm (100 µg/m^3)	0.03 ppm (57 µg/m^3)
	1 Hour	0.100 ppm[b]	0.18 ppm (339 µg/m^3)
Sulfur Dioxide (SO_2)	Annual	0.030 ppm (80 µg/m^3)	—
	24 Hour	0.14 ppm (365 µg/m^3)	0.04 ppm (105 µg/m^3)
	3 Hour	0.5 ppm (1300 µg/m^3)	—
	1 Hour	—	0.25 ppm (655 µg/m^3)
Particulate Matter (PM10)	Annual	—	20 µg/m^3
	24 Hour	150 µg/m^3	50 µg/m^3
Fine Particulate Matter (PM2.5)	Annual	15 µg/m^3	12 µg/m^3
	24 Hour	35 µg/m^3	—
Sulfates (SO_4)	24 Hour	—	25 µg/m^3
Lead	30 Day Average	—	1.5 µg/m^3
	Calendar Quarter	1.5 µg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 µg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Source: ARB 2009a.
Notes:
[a] The 2008 standard is shown above, but as of September 16, 2009 this standard is being reconsidered. The 1997 8-hour standard is 0.08 ppm.
[b] – The U.S. EPA is in the process of implementing this new standard, which became effective April 12, 2010. This standard is based on the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations.

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

The project site is located in the Mojave Desert Air Basin (MDAB) and is under the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). The Riverside County portion of the MDAB is designated as non-attainment for the state ozone and PM10 standards. This area is designated as attainment or unclassified for all federal criteria pollutant ambient air quality standards and the state CO, NO_2, SO_2, and PM2.5 standards. **Air Quality Table 3** summarizes the project site area's attainment status for various applicable state and federal standards.

Air Quality Table 3
Federal and State Attainment Status
Project Site Area within Riverside County

Pollutant	Attainment Status [a]	
	Federal	State
Ozone	Attainment [b]	Moderate Nonattainment
CO	Attainment	Attainment
NO_2	Attainment [c]	Attainment
SO_2	Attainment	Attainment
PM10	Attainment [b]	Nonattainment
PM2.5	Attainment	Attainment

Source: ARB 2009b, U.S.EPA 2009a.
[a] Attainment = Attainment or Unclassified, where Unclassified is treated the same as Attainment for regulatory purposes.
[b] Attainment status for the site area only, not the entire MDAB.
[c] Nitrogen dioxide attainment status for the new federal 1-hour NO_2 standard is scheduled to be determined by January 2012.

Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2004 through 2009 at the most representative monitoring stations for each pollutant are shown in **Air Quality Table 4,** and the 1-hour and 8-hour ozone, and 24-hour PM10 and PM2.5 data for the years 1999 through 2008 are shown in **Air Quality Figure 1**. Ozone data are from the Blythe-445 West Murphy Street monitoring station, PM10, PM2.5, NO_2, and CO data are from the Palm Springs-Fire Station monitoring station and SO_2 data are from the Victorville-14306 Park Avenue monitoring station.

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

Pollutant	Averaging Period	Units	2004	2005	2006	2007	2008	2009	Limiting AAQS[c]
Ozone	1 hour	ppm	0.078	0.084	0.078	0.092	0.074	0.072	0.09
Ozone	8 hours	ppm	0.067	0.072	0.059	0.075	0.071	0.066	0.07
PM10 [a,b]	24 hours	µg/m^3	79	66	73	83	75	--	50
PM10 [a,b]	Annual	µg/m^3	26.4	25.9	24.5	30.5	23.2	--	20
PM2.5 [a]	24 hours	µg/m^3	23.3	25	15.9	20.5	17.1	--	35
PM2.5 [a]	Annual	µg/m^3	9.0	8.4	7.7	8.7	7.2	--	12
CO	1 hour	ppm	2.1	2.1	2.3	1.5	1.3	2.3	20
CO	8 hours	ppm	0.8	0.8	0.85	0.79	0.54	0.67	9.0
NO_2	1 hour	ppm	0.066	0.059	0.093	0.063	0.049	0.048	0.18
NO_2	Annual	ppm	0.013	0.012	0.01	0.01	0.009	0.008	0.03
SO_2	1 hour	ppm	0.011	0.012	0.018	0.009	0.006	0.028	0.25
SO_2	3 hour	ppm	0.007	0.008	0.012	0.005	0.006	0.006	0.5
SO_2	24 hours	ppm	0.003	0.003	0.005	0.005	0.002	0.005	0.04
SO_2	Annual	ppm	0.0013	0.0013	0.0015	0.0013	0.0011	0.000	0.03

Source: ARB 2009c, U.S.EPA 2009b, SCAQMD 2009

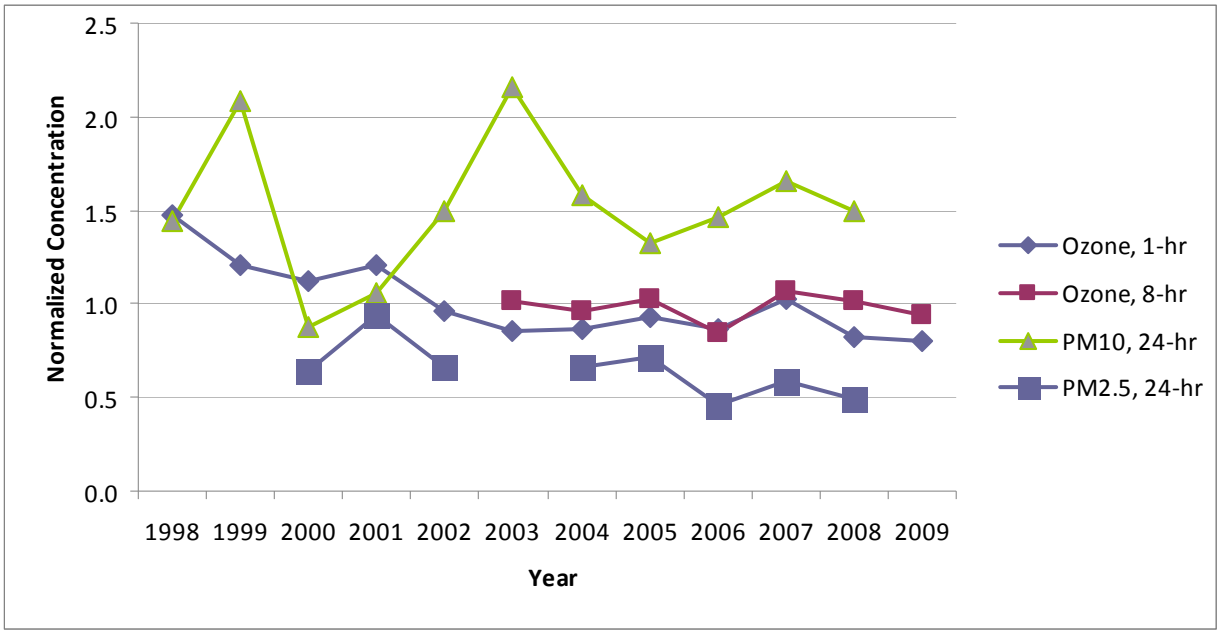
Notes:

[a] Exceptional PM concentration events, such as those caused by wind storms are not shown where excluded by U.S.EPA; however, some exceptions events may still be included in the data presented.

[b] The PM10 data source is in the Coachella Valley that is classified as a serious PM10 nonattainment area.

[c] The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.

Air Quality Figure 1
1998-2009 Historical Ozone and PM Air Quality Data
Blythe and Palm Springs Monitoring Stations, Riverside County[a-c]



Source: ARB 2009c, U.S.EPA 2009b, SCAQMD 2009.
Notes:
[a] The highest measured ambient concentrations of various criteria air contaminants were divided by their applicable standard and provided as a graphical point. Any point on the chart that is greater than one means that the measured concentrations of such air contaminant exceed the standard, and any point that is less than one means that the respective standard is not exceeded for that year. For example the 24-hour PM10 concentration in 2008 is 75 $\mu g/m^3$/50 $\mu g/m^3$ standard = 1.5.
[b] All ozone data are from Blythe-445 West Murphy Street monitoring station. 8-hr ozone data was not available for this station before 2003.
[c] All PM data are from Palm Springs monitoring station. 24-hr PM2.5 data was not available for this station before 2000.

Ozone

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted nitrogen oxides (NOx) and hydrocarbons (Volatile Organic Compounds [VOCs]) in the presence of sunlight to form ozone. Pollutant transport from the South Coast Air Basin (Los Angeles Area) is one source of the of the pollution experienced in the eastern Riverside County portion of the MDAB (SCAQMD 2007, p. 1-2).

As **Air Quality Table 4** and **Air Quality Figure 1** indicate, the 1-hour and 8-hour ozone concentrations measured at the eastern border of Riverside County have been very slowly decreasing and remaining nearly constant over time, respectively. The collected air quality data (not shown) indicate that the ozone violations occurred primarily during the sunny and hot periods typical during May through September.

Nitrogen Dioxide

The entire air basin is classified as attainment for the state 1-hour and annual and federal annual NO_2 standards. The nitrogen dioxide attainment standard could change due to the new federal 1-hour standard, although a review of the air basin wide monitoring data suggest this would not occur for the MDAB.

Approximately 90% of the NOx emitted from combustion sources is nitric oxide (NO), while the balance is NO_2. NO is oxidized in the atmosphere to NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2 typically occur during the fall. The winter atmospheric conditions can trap emissions near the ground level, but lacking substantial photochemical activity (sun light), NO_2 levels are relatively low. In the summer the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions disperse pollutants, preventing the accumulation of NO_2. The NO_2 concentrations in the project area are well below the state and federal ambient air quality standards.

Carbon Monoxide

The area is classified as attainment for the state and federal 1-hour and 8-hour CO standards. The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground level. These conditions occur frequently in the wintertime late in the afternoon, persist during the night and may extend one or two hours after sunrise. The project area has a lack of significant mobile source emissions and has CO concentrations that are well below the state and federal ambient air quality standards.

Particulate Matter (PM10) and Fine Particulate Matter (PM2.5)

PM10 can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere.

The area is non-attainment for state PM10 standards and unclassified for the federal PM10 standard. **Air Quality Table 4** and **Air Quality Figure 1** shows recent PM10/PM2.5 concentrations. The figure shows fluctuating concentrations patterns, and shows clear exceedances of the state 24-hour PM10 standard. It should be noted that exceedance does not necessarily mean violation or nonattainment, as exceptional events do occur and some of those events, which do not count as violations, may be included in the data. The MDAB is designated as nonattainment for the state PM10 standard.

Fine particulate matter, or PM2.5, is derived mainly from either the combustion of materials, or from precursor gases (SOx, NOx, and VOC) through complex reactions in the atmosphere. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds.

The entire MDAB is classified as attainment for the federal standard and, in the project area, is designated unclassified for the state PM2.5 standards. This divergence in the PM10 and PM2.5 concentration levels and attainment status indicates that a substantial fraction of the ambient particulate matter levels are most likely due to localized fugitive dust sources, such as vehicle travel on unpaved roads, agricultural operations, or wind-blown dust[4].

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4 Fugitive dust, unlike combustion source particulate and secondary particulate, is composed of a much higher fraction of larger particles than smaller particles, so the PM2.5 fraction of fugitive dust is much smaller than the PM10 fraction. Therefore, when PM10 ambient concentrations are significantly higher than PM2.5 ambient concentrations this tends to indicate that a large proportion of the PM10 are from fugitive dust emission sources, rather than from combustion particulate or secondary particulate emission sources.

Sulfur Dioxide

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

Summary

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

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

Pollutant	Averaging Time	Recommended Background	Limiting AAQS [b]	Percent of Standard
NO_2	1 hour	119	339	35%
	Annual	19	57	33%
CO	1 hour	2,645	23,000	12%
	8 hour	878	10,000	9%
PM10	24 hour	83	50	166%
	Annual	30.5	20	153%
PM2.5	24 hour [a]	20.5	35	59%
	Annual	8.7	12	73%
SO_2	1 hour	23.6	655	4%
	3 hour	15.6	1,300	1%
	24 hour	13.1	105	12%
	Annual	3.5	80	4%

Source: ARB 2009c, U.S.EPA 2009b and Energy Commission Staff Analysis
Note:
[a] PM2.5 24-hour data shown in **Air Quality Table 4** are 98th percentile values which is the basis of the ambient air quality standard and the basis for determination of the recommended background concentration.
[b] The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.

Where possible, staff prefers that the recommended background concentration measurements come from nearby monitoring stations with similar characteristics. For this proposed project the Blythe monitoring station (ozone), at approximately 35 miles east of the project site, is the closest monitoring station. The Palm Springs monitoring station (PM10, PM2,5, NO_2,and CO) is located approximately 90 miles west of the project site. The Victorville monitoring station (SO_2) is located approximately 145 miles

[5] This table has been updated since the publication of the SA/DEIS to use peak values from 2007 to 2009 background data, for gaseous pollutants, where 2009 data was not available prior to publication of the Staff Assessment/Draft Environmental Impact Study, which shows an improvement in worst-case background concentrations for many of the criteria pollutants included in the air dispersion modeling analysis.

west northwest of the project site. In general, the Palm Springs and Victorville monitoring stations are considered to provide conservative estimates of the worst case background concentrations due to their proximity to the South Coast Air Basin (Metropolitan Los Angeles). Monitoring stations located in Imperial County were not selected or considered as representative due to the predominant air flow patterns and due to air pollution from Mexico that creates a significant local influence for the worst-case pollutant concentration readings within Imperial County.

The background concentrations for PM10 are well above the most restrictive existing ambient air quality standards, while the background concentrations for the other pollutants are all below the most restrictive existing ambient air quality standards.

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

C.1.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff provided a number of data requests regarding the construction and operations emission estimates and air dispersion modeling analysis (CEC 2009d), which the applicant responded to by providing revised emissions estimates and substantially revised and more robust dispersion modeling analysis (GSEP 2009f, TTEC 2010h). Staff has reviewed the revised emission estimates and air dispersion modeling analysis[6] and finds them to be generally reasonable considering the level of emissions mitigation now stipulated to by the applicant.

Project Description

The Genesis Solar Energy Project (GSEP or proposed project) would consist of two independent concentrated solar electric generating facilities (aka power plants or units) with a nominal net electrical output of 125 megawatts (MW) each, for a total net electrical output of 250 MW. The proposed project would use well-established parabolic trough solar thermal technology to produce electrical power using steam turbine

[6] This includes a review of the emission source inputs, including the type of source (point, volume, area) and the variables used to describe each source (emissions, height, location, temperature, etc. as appropriate). Staff does not agree with certain assumptions regarding the onsite fugitive dust calculations or the one way delivery trip assumptions.

Staff does not believe that there are backhauling opportunities at this remote site for the regional trucking necessary to deliver materials from Phoenix, where the applicant assumed they are only responsible for one way delivery trips, which would underestimate the project's offsite emissions. However, this underestimate does not impact the onsite impact modeling analysis or other impact finding for this project, so staff has not made any corrections to the delivery vehicle offsite emission estimates.

Staff did not perform a separate construction emission estimate for this project due to the lack of sensitive receptors near the site and the fact that an underestimation of the fugitive dust or off-site emissions would not impact staff's findings or recommended mitigation measures, Staff did complete such an analysis for the Abengoa Mojave site (CEC 2010i) that had fence line residential receptors and found that a more specific activity based fugitive dust emission estimate did increase the emission estimate for PM10 and PM2.5 by more than a factor of two. This emission potential underscores the need for the fugitive dust controls being recommended by staff.

generators (STG) fed from solar steam generators (SSG) which transfers energy from the solar heated HTF to the steam that drives the STG.

Each plant would use one natural gas-fueled auxiliary boiler to reduce start-up time and provide HTF freeze protection. Freeze protection would maintain the HTF at a minimum temperature of 100 degrees Fahrenheit (°F).

The Project proposes to use a wet cooling tower for power plant cooling. Water for cooling tower make-up, process water make-up, and other industrial uses such as mirror washing would be supplied from on-site groundwater wells, which would also be used to supply water for employee use (*e.g.,* drinking, showers, sinks, and toilets). A package water treatment system would be used to treat the water to meet potable standards. A sanitary septic system and on-site leach field would be used to dispose sanitary wastewater.

Project cooling water blowdown would be piped to lined, on-site evaporation ponds. The ponds would be sized to retain approximately seven years' worth of solids and would be cleaned out periodically during the life of the plant to ensure the solids do not reach a depth greater than approximately three feet. Dewatered residues from the ponds would be sent to an appropriate off-site landfill as non-hazardous waste.

Other construction elements of the project include the access road, the natural gas pipeline connection, and the transmission line tie-in connection. The proposed project's access road from the I-10 would be approximately 6.5 miles long. Natural gas would be supplied via an 8-inch, 6 mile long pipeline that would be connected with the Southern California Gas Company pipeline located just north of the I-10. The transmission line connection would include the construction of an approximately 7 mile long (including the construction of 60 transmission line poles) 230 kV transmission line that would meet the Blythe Energy Project Transmission Line (currently in construction) which it would share, requiring new line cables be strung to the Colorado River Substation. The new transmission line, access road, and natural gas pipeline would be co-located in one linear corridor to serve the main project facility.

Project Emissions

Project Construction

The total duration of project construction for GSEP is estimated to be approximately 37 months. Different areas within the project site and the construction laydown areas would be disturbed at different times over the construction period. Total construction disturbance area would be approximately 1,800 acres, and the permanent disturbance area of the project operations would be approximately 1,360 acres. The maximum acreage disturbed on any one day during construction is estimated by the applicant to be 160 acres. Combustion emissions would result from the off-road construction equipment, including diesel construction equipment used for site grading, excavation, and construction of onsite structures, and water and soil binder spray trucks used to control construction dust emissions. Fuel combustion emissions also would result from exhaust from on-road construction vehicles, including heavy duty diesel trucks used to deliver materials, other diesel trucks used during construction, and worker personal

vehicles and pickup trucks used to transport workers to and from and around the construction site. Fugitive dust emissions would result from site grading/excavation activities, installation of new transmission lines, water and gas pipelines, construction of power plant facilities, roads, and substations, and vehicle travel on paved/unpaved roads.

The shorter duration offsite construction activities are based on the following construction durations and construction period timeframes:

- Access Road Construction – 3 months (Months 1-3)
- Gas Pipeline Construction – 5 months (Months 15-19)
- Transmission Line Construction – 6 months (Months 4-9)

The applicant's maximum daily and total construction period emission estimates, that include the applicant's fugitive dust mitigation assumptions but fleet average off-road equipment emission factors, are provided below in **Air Quality Tables 6** and **7**.

Air Quality Table 6
GSEP Construction - Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Construction Emissions						
Onsite Combustion Emissions	445.8	0.5	220.3	71.2	25.4	25.1
Onsite Fugitive Dust Emissions	--	--	--	--	48.5	10.2
Subtotal of Onsite Emissions	**445.8**	**0.5**	**220.3**	**71.2**	**73.9**	**35.3**
Offsite Emissions						
Access Road Equipment Exhaust	97.3	0.1	48.5	14.4	6.5	6.5
Gas Line Equipment Exhaust	110.9	0.1	63.9	18.8	6.8	6.7
Transmission Line Equipment Exhaust	73.7	0.1	38.6	11.7	4.3	4.3
Delivery Hauling Exhaust	74.97	0.094	26.4	5.72	3.41	3.42
Worker Travel Exhaust	71.8	0.65	716.5	59.5	5.82	5.81
Access Road Fugitive Dust	--	--	--	--	0.9	0.2
Gas Line Fugitive Dust	--	--	--	--	1.2	0.2
Transmission Line Fugitive Dust	--	--	--	--	1.2	0.2
Paved Road Fugitive Dust	--	--	--	--	10.2	1.7
Unpaved Road Fugitive Dust	--	--	--	--	197.1	19.6
Track Out Fugitive Dust	--	--	--	--	4.2	0.7

Source: TTEC 2010a, Tables 2 and 3.
Note: Emissions that were not added may not be additive due to occurring at different times during the construction schedule.

Air Quality Table 7
GSEP Construction – Total Construction Period Emissions (tons)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Construction Emissions						
Onsite Combustion Emissions	109.7	0.12	54.2	17.5	6.24	6.19
Onsite Fugitive Dust Emissions	--	--	--	--	18.6	3.9
Subtotal of Onsite Emissions	**109.7**	**0.12**	**54.2**	**17.5**	**24.84**	**10.09**
Offsite Emissions						
Access Road Equipment Exhaust	2.5	0.003	1.3	0.4	0.17	0.17
Gas Line Equipment Exhaust	5.8	0.007	3.3	1.0	0.36	0.35
Transmission Line Equipment Exhaust	4.5	0.005	2.4	0.7	0.27	0.27
Delivery Hauling Exhaust	30.5	0.037	10.74	2.33	1.39	1.39
Worker Travel Exhaust	29.2	0.3	291.6	24.2	2.4	2.4
Access Road Fugitive Dust	--	--	--	--	0.031	0.01
Gas Line Fugitive Dust	--	--	--	--	0.06	0.01
Transmission Line Fugitive Dust	--	--	--	--	0.07	0.02
Paved Road Fugitive Dust	--	--	--	--	3.82	0.65
Unpaved Road Fugitive Dust	--	--	--	--	6.5	0.65
Track Out Fugitive Dust	--	--	--	--	1.58	0.27
Subtotal of Offsite Emissions	**72.5**	**0.352**	**309.34**	**28.63**	**16.65**	**6.19**
Total Emissions	**182.2**	**0.472**	**363.54**	**46.13**	**41.49**	**16.28**

Source: TTEC 2010h, Table 2.

The applicant used an oversimplified fugitive dust emission calculation method that staff does not consider appropriate for a project with the construction complexity and requirements of GSEP. Staff believes this oversimplified calculation method underestimates the fugitive dust emissions during construction. Additionally, the applicant did not provide a maximum annual emission estimate, and the air dispersion modeling analysis used a 12-month average value which understates the maximum annual emissions and impacts. Staff may create a separate emission estimate, and if necessary modeling analysis, to cover these deficiencies and if performed the results of this separate analysis will be provided in the SA Addendum/FEIS document.

Project Operation

The GSEP facility would be a nominal 250 Megawatt (MW) solar electrical generating facility. The direct air pollutant emissions from power generation are negligible; however, there are auxiliary equipment and maintenance activities necessary to operate and maintain the facility.

The following are the stationary and mobile emission source operating assumptions that were used to develop the operation emissions estimates for the GSEP:

Stationary emission sources[7]:

GSEP would consist of two 125 MW power plant units at the facility, each of which consists of the following equipment and emission estimate bases:

- Auxiliary Boiler: 30.0 MMbtu/hr, fired on natural gas. Emissions estimate is based on 14 hr/day, and 1,000 hr/year of full load operation each.
- Cooling tower: seven cell wet cooling tower unit that provides steam cycle and auxiliary plant cooling. Water recirculation rate of 94,623 gallons/minute, maximum recirculating water total dissolved solids content of 5,000 ppm, and mist eliminator efficiency of 0.0005 percent. Emissions are based on 15 hr/day and 3,200 hr/year of operation each.
- HTF Vent Control System: Venting emission rate based on project specific HTF decomposition rate and decomposition product assumptions. Venting carbon adsorption control system would reduce emissions by 99 percent.
- HTF Piping System: 2,500 valves in service 16 hr/day, 10 pump seals in service 16 hr/day, 6,250 connectors[8] in service 16 hr/day and 10 pressure relief valves in service 8 hr/day. The HTF piping system fugitive emissions have been recalculated by staff, consistent with the procedures developed by Kern County Air Pollution Control District. Those procedures consider the properties of the HTF during the daily operation cycle, where it is assumed that for 16 hours per day the HTF in the piping system is consistent with the properties of a light liquid and for 8 hours per day the HTF in the piping system is consistent with the properties of a heavy liquid. The specific emission factors used are as follows:

Piping Component	**Light Liquid Emission Factor (lb/hr/source)**	**U.S.EPA Reference Table**	**Heavy Liquid Emission Factor (lb/hr/source)**	**U.S.EPA Reference Table**
Valves	5.55E-04	Table 2-9 (100 ppm)	1.90E-05	Table 2-4 (Heavy Oil)
Pump Seals	1.86E-03	Table 2-9 (100 ppm)	5.30E-05	Table 2-12 (Zero Factor)
Flanges/Connectors	1.65E-05	Table 2-12 (Zero Factor)	1.65E-05	Table 2-12 (Zero Factor)
Pressure Relief Valves	9.85E-02	Table 2-5 (<10,000 ppm)	1.90E-05	Table 2-4 (Heavy Oil)

Source: USEPA 1995.
Note: for pressure relief valves the in service emission factors are for gas service, rather than light liquid service.

These emission factors may not assume appropriate control efficiencies for the inspection and maintenance program that will be required by MDAQMD or recommended by staff. Staff will update this emission estimate, if necessary, after receipt of the MDAQMD Final Determination of Compliance for this project and further consideration of the effectiveness of the inspection and maintenance program.

[7] In addition to the list of equipment below the applicant included emission estimates for a diesel tank and HTF waste load out. Staff has not included these emission sources due to: 1) their negligible emissions potential; 2) their exempt permitting status; and 3) to be consistent with other recent thermal solar project assessments.

[8] Staff increased the number of flanges/connectors to a value of 6,250 per unit to be consistent with the component count ratios of other currently analyzed projects using HTF piping systems. This revision has a very minor effect on the emission estimate for the HTF piping system.

- Fire pump engine: 315 horsepower (hp) diesel-fired engine. One hour per day and 52 hours per year maximum operation.
- Emergency generator engine: 1341 hp (1000 kW) diesel-fired engine. One hour per day and 52 hours per year maximum operation.
- Gasoline tank: 2,000 gallon tank: Phase 1 vapor recovery, no Phase 2 vapor recovery. Tank annual 10,768 gallons. Daily emissions based on annual emissions divided by 365 days/year.

Mobile emissions source:

- Mobile emissions sources required for operation and maintenance and employee trips are estimated based on vehicle miles traveled (VMT) and operating hours. Each mobile source has different basis for emissions estimates as provided in the applicant's revised emission estimate spreadsheets (TTEC 2010h). The round trip distance used for these vehicle trips was not considered reasonable for this remote site, so the trip distances and the offsite emission estimates, using updated emission factors from the SCAQMD CEQA website, were revised by staff.

The GSEP onsite stationary and onsite and offsite mobile source emissions, totaled or both power units, are estimated and summarized in **Air Quality Tables 8** and **9**.

Air Quality Table 8
GSEP Operations - Maximum Daily Emissions (lbs/day)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
HTF Auxiliary Heaters	9.25	0.224	15.8	2.46	4.19	4.19
Cooling Towers	--	--	--	--	35.47	35.47
HTF Venting/Control System	--	--	--	2.95	--	--
HTF Components Fugitive	--	--	--	82.25	--	--
Emergency Fire Pump Systems	3.73	0.01	0.62	0.08	0.08	0.08
Emergency Electrical Generators	29.12	0.03	0.77	0.59	0.11	0.11
Gasoline Storage Tank	--	--	--	0.38	--	--
Onsite Operations Vehicle	0.08	0.00	0.05	0.01	0.01	0.01
Operations Fugitive Dust	--	--	--	--	85.4	18.1
Subtotal of Onsite Emissions	**42.18**	**0.26**	**17.24**	**88.72**	**125.26**	**57.96**
Offsite Emissions						
Delivery Vehicles	21.94	0.03	7.45	1.81	1.07	0.92
Employee Vehicles	3.52	0.05	35.11	3.69	0.45	0.29
Offsite Vehicle Fugitive Dust	--	--	--	--	8.20	0
Subtotal of Offsite Emissions	**25.46**	**0.08**	**42.56**	**5.50**	**9.72**	**1.21**
Total Maximum Daily Emissions	**67.64**	**0.34**	**59.8**	**94.22**	**134.98**	**59.17**

Source: TTEC 2010h, with the HTF component emissions and offsite emissions revised by staff.

Air Quality Table 9
GSEP Operations - Maximum Annual Emissions (tons/yr)

	NOx	SOx	CO	VOC	PM10	PM2.5
Onsite Operation Emissions						
HTF Auxiliary Heaters	0.17	0.00	0.28	0.04	0.08	0.08
Cooling Towers	--	--	--	--	3.78	3.78
HTF Venting/Control System	--	--	--	0.54	--	--
HTF Components Fugitive	--	--	--	15.01	--	--
Emergency Fire Pump Systems	0.10	0.00	0.02	0.00	0.00	0.00
Emergency Electrical Generators	0.76	0.00	0.02	0.02	0.00	0.00
Gasoline Storage Tank	--	--	--	0.07	--	--
Onsite Operations Vehicle	0.35	0.00	0.24	0.05	0.03	0.03
Operations Fugitive Dust	--	--	--	--	15.60	3.30
Subtotal of Onsite Emissions	**1.38**	**0.01**	**0.56**	**15.73**	**19.49**	**7.19**
Offsite Emissions						
Delivery Vehicles	1.21	0.00	0.41	0.10	0.06	0.05
Employee Vehicles	0.64	0.01	6.41	0.67	0.08	0.05
Offsite Vehicle Fugitive Dust	--	--	--	--	1.31	0.00
Subtotal of Offsite Emissions	**1.85**	**0.01**	**6.82**	**0.77**	**1.45**	**0.10**
Total Maximum Daily Emissions	**3.23**	**0.02**	**7.38**	**16.5**	**20.94**	**7.29**

Source: TTEC 2010h, with the HTF component emissions and offsite emissions revised by staff.

Project Construction and Operation Overlapping

Units #1 and #2 would be developed in phases with construction for Unit #2 scheduled to begin twelve months after construction of Unit #1. Each unit would take approximately twenty five months to construct before beginning commercial operation. Unit #1 would be expected to begin commercial operation in the twenty fifth month of construction and Unit #2 would be expected to begin commercial operation after the thirty seventh month of construction. Although there would be an overlap of construction and commercial operation of twelve months, staff does not anticipate this overlap to be the maximum worst case scenario. Construction emissions are considerably higher than operating emissions and the maximum construction emissions occur early in the overall construction process (months 2 through 13), so any overlap after the maximum construction period is assumed not to create a new maximum emissions scenario. Therefore, staff concludes that the overlapping emissions and impacts during this overlapping period would be no worse than the worst-case construction impacts and has not performed any additional impact assessment of the construction/operation overlapping period.

Initial Commissioning

Initial commissioning refers to a period prior to beginning commercial operation when the equipment undergoes initial tests. Because of this proposed project's use of a non-fuel fired generating technology, staff does not expect major changes in emissions from the facility commissioning activities compared to that of normal operation.

Dispersion Modeling Assessment

While the emissions are the actual mass of pollutants emitted from the proposed project, the impacts are the concentration of pollutants from the proposed project that reach the ground level. When emissions are expelled at a high temperature and velocity

through a relatively tall stack, the pollutants would be greatly diluted by the time they reach ground level. For this proposed project there are no very tall emission stacks, but the construction and maintenance vehicles and emergency engine do have high temperature and velocity exhausts; and the boilers also have relatively high exhaust temperatures and velocities. The emissions from the proposed project, both stationary source and onsite mobile source emissions, are analyzed through the use of air dispersion models to determine the probable impacts at ground level.

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

The applicant used the U.S.EPA guideline ARMS/EPA Regulatory Model (AERMOD) model to estimate ambient impacts from project construction and operation. The construction emission sources for the site were grouped into two categories: equipment (off-road equipment); and vehicles (on-road equipment), where the exhaust and fugitive dust emissions for each type were calculated for particulate matter modeling. Emissions from onsite equipment engines during construction were modeled as point sources and fugitive emission sources were modeled as area sources. For operation the stationary sources were modeled as point sources and the maintenance vehicle emissions, tailpipe and fugitive dust emissions, were modeled as area sources.

The inputs for the air dispersion models include stack information (exhaust flow rate, temperature, and stack dimensions), specific fire pump engine, emergency generator, auxiliary boiler, cooling tower, and vehicle emission data; and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For this project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Blythe Airport Automated Surface Observing Systems (ASOS) monitoring station during 2002 through 2006.

NOx emissions from internal combustion sources, such as diesel engines, are primarily in the form of nitric oxide (NO) rather than NO_2. The NO converts into NO_2 in the atmosphere, primarily through the reaction with ambient ozone. The applicant used the U.S.EPA ambient ratio method (ARM) default multiplier of 0.75 as the worst-case downwind annual NO_2/NOx ratio for the determination of the annual NO_2 concentration for construction. However, the applicant did not use any modeling procedures to consider the short-term NO_2/NOx ratio for construction or operation, which would be lower than the annual ARM value, or apply the ARM multiplier to determine the annual NO2 impacts determined for operation. Therefore, the modeling method is very conservative and will over predict actual worst-case 1-hour NO_2 concentrations.

The U.S. Environmental Protection Agency (U.S. EPA) is implementing a new, 1-hour NO_2 standard that became effective April 12, 2010. This new standard is expressed as a 3-year average of the 98th percentile of the *daily maximum* 1-hour concentration (i.e., the 8th highest of daily highest 1-hour concentrations). The new standard requires “first

tier" ambient NO_2 monitoring near major roadways as defined in the implementing language and "second tier" monitoring for regional NO_2 concentrations. Although U.S. EPA has specified NO_2 monitoring requirements and a schedule for determining attainment status relative to this new standard, it has not yet developed modeling software to generate the statistics in a form that can be used in a compliance demonstration. Therefore, while the applicant is working on completing a modeling analysis to determine compliance with this new standard, the analyses described below do not yet include an analysis of this project's compliance with the new federal 1-hour NO_2 standard. The results of the applicant's federal 1-hour NO_2 modeling analysis will be provided in the Supplemental Staff Assessment. Based on similar modeling analyses completed for several other current thermal solar projects, staff expects that the applicant will be able to show compliance with this new ambient air quality standard.

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

The following sections discuss the proposed project's short-term direct construction and operation ambient air quality impacts, as estimated by the applicant, and describes appropriate mitigation measures.

Construction Impacts

Using estimated peak onsite hourly, daily and annual construction equipment exhaust emissions, the applicant modeled the proposed project's construction emissions to determine impacts (GSEP 2009f). To determine the construction impacts on ambient standards (i.e. 1-hour through annual) it was assumed that the emissions would occur during a daily construction schedule of 10 hour days (8 am to 6 pm). The predicted proposed project concentration levels were added to a conservatively estimated background of existing emission concentration levels (**Air Quality Table 5**) to determine the cumulative effect. The results of the applicant's modeling analysis are presented in **Air Quality Table 10**. The construction modeling analysis includes both the onsite fugitive dust and vehicle tailpipe emission sources estimated by the applicant (with applicant-proposed control measures) and summarized in **Air Quality Tables 6** and **7**.

Air Quality Table 10
Maximum Project Construction Impacts

Pollutants	Avg. Period	Project Impact [a] ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	84.1	119	203.1	339	60%
	Annual	0.34	19.0	19.3	57	34%
CO	1-hr	41.6	2,645	2,687	23,000	12%
	8-hr	10.8	878	889	10,000	9%
PM10	24-hr	45.0	83	128	50	256%
	Annual	0.47	30.5	31.0	20	155%
PM2.5	24-hr	9.5	20.5	30.0	35	86%
	Annual	0.11	8.7	8.8	12	73%
SO_2	1-hr	0.09	23.6	23.7	665	4%
	3-hr	0.06	15.6	15.7	1,300	1%
	24-hr	0.02	13.1	13.1	105	12%
	Annual	<0.001	3.5	3.5	80	4%

Source: GSEP 2009f, DR 19.
Note:
[a] – These results do not include the fugitive dust emission revision performed by the applicant in the revised data responses (TTEC 2010h).

This modeling analysis indicates, with the exception of PM10 that the proposed project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. As noted previously, the applicant's construction emissions estimate may not be conservative, specifically for particulate emissions. The applicant's air dispersion modeling procedures for particulate emissions were very conservative and would significantly over predict emission impacts at the fence line. Specifically, the use of area sources for the fugitive dust emissions, and the input assumptions of a release height of 0.5 meters with an initial vertical dimension of zero meters, will over predict impacts. Staff did not have the time to perform a revised emissions and dispersion modeling analysis but believes that a more refined modeling analysis for the fugtive dust emissions, even considering an increase in emissions from a more refined fugitive dust emission estimate, would provide results similar in magnitude to those shown above in **Air Quality Table 10**.

Also, the conditions that would create worst-case project modeled impacts (low wind speeds) are not the same conditions when worst-case background is expected. Additionally, the worst-case predicted PM10 impacts occur at the fence line and drop off quickly with distance from the fence line. In light of the existing PM10 non-attainment status for the project site area, staff considers the construction PM10 emissions to be potentially CEQA significant and recommends that the off-road equipment and fugitive dust PM10 emissions be mitigated pursuant to CEQA.

In light of the existing ozone non-attainment status for the project site area, staff considers the construction NOx and VOC emissions to be potentially CEQA significant and recommends that the off-road equipment NOx and VOC emissions be mitigated pursuant to CEQA.

Staff concludes that with implementation of staff-proposed mitigation measures the construction impacts would not contribute substantially to exceedances of PM10 or ozone standards.

The modeling analysis shows that, after implementation of the recommended emission mitigation measures, the proposed project's construction is not predicted to cause new exceedances of the NAAQS. Therefore, staff also determined that no adverse NEPA impacts would occur after implementation of the recommended mitigation measures.

Construction Mitigation

Applicant's Proposed Mitigation

To mitigate the impacts due to construction of the facility, the applicant has stipulated to construction mitigation measures that are similar to older versions of staff's recommended conditions **AQ-SC3** and **AQ-SC5** used for gas turbine siting cases in the past (GSEP 2009a, Section 5.2.2.6). The measures specifically stipulated to by the applicant are listed below:

Proposed Exhaust Emissions Control:

- The Applicant will work with the construction contractor to use, to the extent feasible, EPA/Air Resources Board (ARB) Tier II/Tier III engine compliant equipment for equipment over 100 hp.
- Ensure periodic maintenance and inspections per the manufacturer's specifications.
- Reduce idling time through equipment and construction scheduling.
- Use California low sulfur diesel fuels (<=15 ppmw S).

Proposed Fugitive Dust Emissions Control:

- The Applicant will have an on-site construction mitigation manager who will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.
- All unpaved roads and disturbed areas in the Project and laydown construction sites will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on an average schedule of every three hours during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.
- On-site vehicle speeds will be limited to 15 miles per hour (mph) on unpaved areas within the Project construction site.
- The construction site entrance(s) will be posted with visible speed limit signs.
- All construction equipment vehicle tires will be inspected and cleaned as necessary to be free of dirt prior to leaving the construction site via paved roadways.
- Gravel ramps will be provided at the tire cleaning area.
- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.
- All construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been provided.

- Construction areas adjacent to any paved roadway will be provided with sandbags or other similar measures as specified in the construction SWPPP to prevent runoff to roadways.
- All paved roads within the construction site will be cleaned on a periodic basis (or less during periods of precipitation), to prevent the accumulation of dirt and debris.
- The first 500 feet of any public roadway exiting the construction site will be cleaned on a periodic basis (or less during periods of precipitation), using wet sweepers or air-filtered dry vacuum sweepers, when construction activity occurs or on any day when dirt or runoff from the construction site is visible on the public roadways.
- Any soil storage piles and/or disturbed areas that remain inactive for longer than 10 days will be covered, or treated with appropriate dust suppressant compounds.
- All vehicles used to transport solid bulk material on public roadways and have the potential to cause visible emissions will be covered, or the materials will be sufficiently wetted and loaded onto the trucks in a manner to minimize fugitive dust emissions. A minimum freeboard height of two feet will be required on all bulk materials transport.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.
- Disturbed areas will be re-vegetated or covered with gravel or other dust suppressant material as soon as practical and restored in accordance with BLM requirements.

Adequacy of Proposed Mitigation

Staff generally concurs with the applicant's proposed mitigation measures, which mirror many of the staff mitigation recommendations from previous siting cases. But staff has been proposing additional fugitive dust mitigation, such as requiring the use of soil binders or paving to reduce emissions on unpaved roads, that is considered necessary to reduce the very high fugitive dust emission potential for large solar projects, such as GSEP. Staff also believes that the off-road equipment mitigation measures need to be updated to meet current staff recommendations.

Staff Proposed Mitigation

Staff recommends the applicant's proposed construction mitigation be formalized, with modifications that update the measures to meet current staff recommendations, in staff Conditions of Certification **AQ-SC1** through **AQ-SC5**. Staff has determined that the proposed conditions of certification would mitigate all construction air quality impacts of the proposed project to less than significant levels pursuant to CEQA.

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

Operational Impacts and Mitigation

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

Operational Modeling Analysis

Using estimated peak onsite hourly, daily and annual operating emissions, the applicant modeled the proposed project's operation emissions to determine impacts (GSEP 2009f). The predicted proposed project concentration levels were added to a conservatively estimated background of existing emission concentration levels (**Air Quality Table 5**) to determine the cumulative effect. **Air Quality Table 11** presents the results of the applicant's modeling analysis. Staff notes that the applicant's determined maximum 1-hour NO_2 concentration was not based on the ozone limiting method (OLM) calculation, or any other method to determine the NO_2/NOx ratio, and so assumes that all NOx emission are NO_2 which overstates the maximum NO_2 impacts. The operation modeling analysis includes emissions from the stationary sources and the onsite fugitive dust and vehicle tailpipe emission sources estimated by the applicant, which all include the applicant's proposed control measures, and that are summarized in **Air Quality Tables 8** and **9**.

Air Quality Table 11
Project Operation Emission Impacts

Pollutants	Avg. Period	Project Impact [a] ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	189.9	119	308.9	339	91%
	Annual	0.06	19.0	19.1	57	33%
CO	1-hr	12.3	2,645	2,657	23,000	12%
	8-hr	2.5	878	881	10,000	9%
PM10	24	15.9	83	98.8	50	198%
	Annual	4.3	30.5	34.8	20	174%
PM2.5	24	3.4	20.5	23.9	35	68%
	Annual	0.9	8.7	9.6	12	80%
SO_2	1-hr	0.184	23.6	23.8	665	4%
	3-hr	0.102	15.6	15.7	1,300	1%
	24-hr	0.008	13.1	13.1	105	12%
	Annual	0.0003	3.5	3.5	80	4%

Source: GSEP 2009f, DR 27, Table 6.
Note:
[a] – These results do not include the fugitive dust emission revision performed by the applicant after the data responses (TTEC 2010h).

This modeling analysis indicates, with the exception of 24-hour and annual PM10 impacts, that the proposed project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. The conditions that would create worst-case project modeled impacts (low wind speeds) are not the same conditions when worst-case background is expected for PM10/PM2.5. Additionally, the worst-case PM2.5 and PM10 impacts occur at the fence line and drop off quickly with distance from the fence line. Therefore, staff concludes that the operation impacts, when considering staff's mitigation measures, would not contribute substantially to exceedances of the PM10 CAAQS.

However, in light of the existing PM10 and ozone non-attainment status for the project site area, staff considers the operation NOx, VOC, and PM emissions to be potentially CEQA significant and recommends that the off-road equipment and fugitive dust emissions be mitigated pursuant to CEQA.

The modeling analysis shows that, after implementation of the recommended emission mitigation measures, the proposed project's operation is not predicted to cause new exceedances of the NAAQS. Therefore, it has also been determined that no adverse NEPA impacts would occur after implementation of the recommended mitigation measures.

Operations Mitigation

Applicant's Proposed Mitigation

Emission Controls

As discussed in the air quality section of the AFC and Data Reponses (GSEP 2009f, TTEC 2010h), the applicant proposes the following Best Available Control Technology (BACT) emission controls on the stationary equipment and other emission mitigation measures for the mobile equipment associated with the operation of the GSEP:

HTF Auxiliary Boilers

The applicant has proposed two 30.0 MMbtu/hr auxiliary boilers, which would be fired on pipeline quality natural gas, and would be equipped with low NOx burner technology. The operation of each boiler is limited to 14 hours a day and 1,000 hours per year. The proposed boilers would each have the following emission limits:

- NOx: 0.33 lbs/hr (9 ppmv @ 3% O2)
- CO: 0.563 lbs/hr (50 ppmv @ 3% O2)
- VOC: 0.088 lbs/hr
- PM10/PM2.5: 0.15 lbs/hr
- SO_2: 0.008 lbs/hr

Emergency Electrical Generators

The applicant has proposed two 1341 hp (1000 kW) emergency generator engines. The engines would meet BACT requirements through the engine design (U.S.EPA/ARB Tier 2 compliant engines), and ARB diesel fuel. Testing would be for less than 60 minutes per day per engine and the engines would not run for more than 50 hours per year each. The emergency generator engines would have the following emission guarantees:

- NOx: 4.93 gram/bhp-hour
- CO: 0.13 gram/bhp-hour
- VOC: 0.1 gram/bhp-hour
- PM10/PM2.5: 0.018 gram/bhp-h
- SO_2: ARB diesel fuel (15 ppm sulfur)

Fire Water Pump Engines

The applicant has proposed two 315 hp fire water pump engines. The engines would meet BACT requirements through the engine design (U.S.EPA/ARB Tier 3 compliant engines), and ARB diesel fuel. Testing would be for less than 60 minutes per day per engine and the engines would not run for more than 50 hours per year each. The fire water pump engines would have the following emission guarantees:

- NOx: 2.69 gram/bhp-hour
- CO: 0.45 gram/bhp-hour
- VOC: 0.06 gram/bhp-hour
- PM10/PM2.5: 0.055 gram/bhp-hour
- SO_2: ARB diesel fuel (15 ppm sulfur)

Cooling Towers

The applicant has proposed two seven-cell cooling towers, which are used for main steam power cycle and auxiliary cooling. The cooling towers would each have a high efficiency drift eliminator guaranteed to control drift to 0.0005 percent of the water recirculation rate. The cooling towers would have a maximum TDS of 5,000 ppm and would operate 15 hours per day and 3,200 hours per year. Each cooling tower would have the following emission limits:

- PM10/PM2.5: 1.18 lbs/hr

HTF Vent Exhausts

The applicant has proposed one HTF ullage tank system for the project. The HTF breaks down over time and these breakdown products need to be released to maintain the working composition of the HTF. The breakdown products are a mixture of higher and lower boiling organic compounds (VOC) that are vented in order to remove them from the HTF mixture. The VOC emissions would be controlled with a carbon adsorption system with a control efficiency of 99%. VOC emissions would be limited to a maximum of 0.337 lb/hr after control, combined for both systems, and the HTF ullage tank would be vented a maximum of 8.8 hours per day and 3,200 hours/year:

HTF Piping Systems

The two HTF piping systems are composed of a number of piping components (pump seals, valves, pressure relief vents, flanges, etc.). These components would leak hot HTF that would evaporate and cause VOC emissions. The applicant is proposing to use double mechanical seals on pumps and maintenance inspections and repair of the piping system to reduce HTF leaks.

Gasoline Tank

The applicant has proposed a 2,000 gallon gasoline tank with Phase I vapor recovery for tank filling, but no Phase II vapor recovery for vehicle refueling. The annual tank throughput is estimated to be 10,768 gallons and would have the following emission factor and annual emissions:

- VOC: 13 lbs/1,000 gallons throughput and 0.07 tons/year

It should be noted that the MDAQMD will require the tank to have both Phase I and Phase II vapor controls, so the emissions determined by the applicant for the gasoline tanks are over estimated.

Operational and Maintenance Vehicles

To minimize operating emissions, the applicant has proposed mitigation measures to minimize the operating and maintenance vehicles emissions. Following are the proposed mitigation measures (GSEP 2009c, p.4; GSEP 2009f, DR 24).

- Vehicles (mobile sources) used for maintenance activities will meet all required exhaust standards as implemented and enforced by the CARB and the United States Environmental Protection Agency.
- Vehicles will use only CARB certified motor vehicle fuels.
- Vehicles will be maintained per the manufacturers' operations and maintenance schedules.
- Vehicles will be "smog" tested (as applicable) on the schedule as determined by the California DMV
- Onsite vehicle speeds will be limited to the following: (1) <=15 mph on onsite paved roads, and (2) <=5 mph on onsite unpaved (gravel) roads.
- Road maintenance will be performed as needed. Paved roads will be swept, sealed, and/or overlaid as needed. Gravel surfaces will inspected and maintained as necessary to insure the integrity of the gravel surface.

Additionally, the applicant would be willing to stipulate to a condition of certification that would require a review of available alternative low-emission vehicle technologies, including electric and hydrogen fueled vehicles, and use of those technologies to replace the proposed diesel and gasoline fueled vehicles used for operations maintenance if lower emission alternative technology vehicles are both available and not cost prohibitive (GSEP 2009f, DR 24).

Adequacy of Proposed Mitigation

Staff generally concurs with the District’s preliminary determination that the proposed project’s stationary source proposed emission controls/emission levels for criteria pollutants meet regulatory requirements and that the proposed stationary source emission levels are reduced adequately. However, staff will include a comment in the Energy Commission’s PDOC Comment Letter regarding whether Phase II vapor controls are required by District rule for the proposed onsite gasoline tank.

Staff believes that additional or different mitigation measures are needed for adequate control of both vehicle tailpipe and fugitive dust emissions from maintenance operations. Specifically, additional fugitive emissions control is necessary by ensuring that vehicle travel is only conducted on paved and stabilized surfaces. Additionally, a few of the applicant's proposed vehicle mitigation measures are required by law, and therefore are not mitigation measures.

Staff Proposed Mitigation

As mentioned earlier in the discussions of the ozone and PM10 impacts, staff concludes that the proposed project's direct stationary source ozone precursor and PM10 emissions are minimal, but when combined with the maintenance vehicles emissions could be significant. Additionally, staff believes that a solar renewable project, which would have a 30-year life in a setting likely to continue to be impacted by both local and upwind emission sources, should address its contribution to the potentially ongoing nonattainment of the PM10 and ozone standards. Staff concludes that the applicant's proposed mitigation measures, that mirror staff's current mitigation requirements for other large solar projects, would adequately mitigate the proposed project's stationary source, mobile equipment, and fugitive dust emissions. Therefore, staff recommends the project owner be required to purchase new on-road and off-road vehicles that meet California emissions standards (**AQ-SC6**) and that the project owner be required to apply fugitive dust controls that are equivalent to those recommended for construction (**AQ-SC7**) to adequately mitigate the proposed project's operation emissions.

Staff is also proposing Condition of Certification **AQ-SC8** to ensure that the Energy Commission license is amended as necessary to incorporate changes to the air quality permits.

Staff has determined that the proposed emission controls and emission levels, along with the applicant proposed and staff recommended emission mitigation measures, would mitigate all proposed project air quality impacts to less than significant pursuant to CEQA.

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

Indirect Pollutant and Secondary Pollutant Impacts

The proposed project would have direct emissions of chemically reactive pollutants (NOx, SOx, and VOC), but would also have indirect emission reductions associated with the reduction of fossil-fuel fired power plant emissions due to the proposed project displacing the need for their operation, since renewable energy operates on a must take basis. The exact nature and location of such reductions is not known, so the discussion below focuses on the direct emissions from the proposed project within the Riverside County portion of the Mojave Desert Air Basin.

Ozone Impacts

There are air dispersion models that can be used to quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are

input into the model to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the GSEP do have the potential (if left unmitigated) to contribute to higher ozone levels in the region. These impacts would be cumulatively significant under CEQA because they would contribute to ongoing violations of the state ozone ambient air quality standards.

PM2.5 Impacts

Secondary particulate formation, which is assumed to be 100 percent PM2.5, is the process of conversion from gaseous reactants to particulate products. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of air pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first and then react with ambient ammonia to form sulfate and nitrate. The sulfuric acid reacts with ammonia much faster than nitric acid and converts completely and irreversibly to particulate form. Nitric acid reacts with ammonia to form both a particulate and a gas phase of ammonium nitrate. The particulate phase would tend to fall out; however, the gas phase can revert back to ammonia and nitric acid. Thus, under the right conditions, ammonium nitrate and nitric acid establish a balance of concentrations in the ambient air.
The emissions of NOx and SOx from GSEP do have the potential (if left unmitigated) to contribute to higher PM2.5 levels in the region; however, the region is in attainment with PM2.5 standards and the low level of NOx and SOx emissions from the proposed project would not significantly impact that status.

Impact Summary

The applicant is proposing to mitigate the proposed project's stationary source NOx, VOC, SO_2, and PM10/PM2.5 emissions through the use of Best Available Control Technology (BACT) and reduce the proposed project's mobile source emissions by using vehicles that meet ARB emission standards. With the applicant's stipulated vehicle emission mitigation, which is formalized and augmented in Staff Condition of Certification **AQ-SC6,** staff concludes that the proposed project would not cause significant secondary pollutant impacts.

C.1.4.3 CEQA LEVEL OF SIGNIFICANCE

Project Construction

Staff considers the unmitigated construction NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, staff is recommending that the NOx, VOC, and PM emission be mitigated pursuant to CEQA. Staff is recommending several mitigation measures (**AQ-SC1** through **AQ-SC5**), that also include the applicant's stipulated construction mitigation measures, to limit exhaust emissions and fugitive dust emissions during project construction to the extent feasible.

Therefore, while there would be adverse CEQA air quality impacts during construction, they are expected to be less than significant after implementation of the applicant's stipulated and staff's recommended mitigation measures.

Project Operation

Staff considers the unmitigated operation and maintenance NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, staff is recommending that the NOx, VOC, and PM emissions be mitigated pursuant to CEQA. Staff is recommending two mitigation measures (**AQ-SC6** and **AQ-SC7**), that also include the applicant's stipulated operations emission mitigation, to limit exhaust emissions and fugitive dust emissions during project operation to the extent feasible.

Therefore, while there would be adverse CEQA air quality impacts during operation, they are expected to be less than significant after implementation of the applicant's stipulated and staff's recommended mitigation measures.

Closure and Decommissioning

Eventually the facility would close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those emissions would no longer occur. The only other expected emissions would be equipment exhaust and fugitive particulate emissions from the dismantling activities. These activities would be of a much shorter duration than construction of the proposed project, equipment are assumed to have much lower comparative emissions due to technology advancement, and fugitive dust emissions would be required to be controlled in a manner at least equivalent to that required during construction. Therefore, while there would be adverse CEQA air quality impacts during decommissioning, they are expected to be less than significant.

C.1.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, and would be a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by removing the eastern solar field, it would reduce the water required for cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.1.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

The setting and existing conditions for this alternative are the same as the proposed project. The existing ambient air quality does not change and the facility would still be within the same air basin and subject to the same air quality LORS.

C.1.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Reduced Acreage Alternative would reduce the total construction emissions of the proposed project by somewhat less than 50 percent, and operation emissions of the proposed project (see **Air Quality Tables 8** and **9**) by somewhat less than 50 percent, due to reduced efficiencies of the smaller project. However, the maximum daily and annual construction emissions are assumed to be similar to the proposed project assuming the same level of maximum activity with a reduction in the overall construction schedule. Therefore, the maximum construction emissions would be approximately the same as the emissions shown in **Air Quality Tables 6** and **7**.

The maximum short-term and maximum annual construction pollutant concentration impacts for the Reduced Acreage Alternative are assumed to be essentially the same as that estimated for the proposed project, assuming the same maximum daily and annual construction activities. Therefore, the worst-case short-term and annual construction pollutant concentration impacts for this alternative are assumed to be essentially the same as those shown for the proposed project in **Air Quality Table 10**.

The maximum short-term and maximum annual operation pollutant concentration impacts for the Reduced Acreage Alternative are likely to be somewhat less than that for the proposed project as shown in **Air Quality Table 11**. However, the amount of reduction in impacts is uncertain as the worst case impacts are based on factors such as proximity to receptors and terrain as well as total emissions.

The results of the Reduced Acreage Alternative would be the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would be similar to the proposed project and would require the same level of mitigation. The total construction period and total construction emissions would be reduced from those required to construct the proposed project.
- The operation emissions and ground level pollutant concentration impacts would be somewhat lower than the proposed project, but the same level of mitigation would be required.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be reduced.

If the Reduced Acreage Alternative were approved, other renewable projects may be developed on other sites in the Riverside County, the Colorado Desert, MDAB, or in adjacent states to fill the 125 MW gap not supplied by the proposed project as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

C.1.5.3 CEQA LEVEL OF SIGNIFICANCE

The level of significance under CEQA for the Reduced Acreage Alternative would be the same as for the proposed project, with the same significance rationale, where if left unmitigated there is the potential for significant PM10 and ozone precursor (NOx and

VOC) emission impacts during the Alternative project's construction and operation. The mitigation that would be proposed for the Reduced Acreage Alternative would be the same as that proposed for the proposed project (staff and MDAQMD recommended conditions of certification).

C.1.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the wet cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power blocks, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

C.1.6.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the setting and existing conditions for this alternative are the same as the proposed project. The existing ambient air quality does not change and the facility would still be within the same air basin and subject to the same air quality LORS.

C.1.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The magnitude of emissions from the construction of the air-cooled condenser (ACC) would be different than those from the construction of the proposed wet-cooled system. Approximately 40% more land would be disturbed for the ACCs as compared with the cooling towers, and the laydown area(s) may have to be increased to store and/or prepare the air-cooled radiator components prior to installation. Grading and construction equipment would be required to prepare the site and install the ACC system. The additional soil disturbance and equipment activity would result in increased fugitive dust and vehicle exhaust emissions (as compared to the emissions shown in **Air Quality Tables 6** and **7**), which could occur during the worst case construction periods. This additional construction in the context of the total construction requirements for the project are relatively minor, but would to some small extent increase the project's construction emissions.

There would be a minor reduction in particulate (PM10 and PM2.5) emissions from the removal of the two cooling towers, which as shown in **Air Quality Table 9** would be estimated to be a reduction of approximately 3.8 tons per year combined. However, the

use of the ACCs would be expected to increase the auxiliary boilers startup requirements and increase the criteria pollutant emissions from the auxiliary boilers as shown in **Air Quality Tables 8** and **9**. Additionally, the ACCs would to a small extent reduce the steam power cycle's efficiency, which would to a small extent reduce the total amount of facility generation and reduce the displacement of fossil fuel fired power plant emissions from the GSEP.

The maximum short-term and maximum annual construction pollutant concentration impacts for the Dry Cooling Alternative would be slightly higher than that estimated for the proposed project, assuming that the increased ACC construction requirements occur during the maximum daily and annual construction periods. Therefore, the worst-case short-term and annual construction pollutant concentration impacts for this alternative would likely be slightly higher than those shown for the proposed project in **Air Quality Table 10**. With the implementation of the staff proposed construction mitigation, staff believes that impacts from this construction emission increase would be less than significant.

The maximum short-term and maximum annual operation pollutant concentration impacts for the Dry Cooling Alternatives would be expected to be reduced for particulate (PM10/PM2.5) emissions and very slightly increased for the other criteria pollutants from those for the proposed project as shown in **Air Quality Table 11**. With the implementation of the District and staff proposed operation mitigation, staff believes that impacts from the operation emissions for this alternative would be less than significant.

The results of the Cooling Tower Alternative would be the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would very slightly higher than those of the proposed project and would require the same level of mitigation.
- The operation emissions and ground level pollutant concentration impacts of particulate emissions would be somewhat lower than the proposed project, and the operation emissions and ground level pollutant concentration impacts of the other criteria pollutants would be somewhat higher than the proposed project. However, the same level of mitigation, with the exception for the cooling tower emission controls, would be required.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated, but mainly out of air basin, criteria pollutant emissions would be very slightly reduced due to a small reduction in overall facility efficiency.

C.1.6.3 CEQA LEVEL OF SIGNIFICANCE

The level of significance under CEQA for the Dry Cooling Alternative would be the same as for the proposed project, with the same significance rationale, where if left unmitigated there is the potential for significant PM10 and ozone precursor (NOx and VOC) emission impacts during the Alternative project's construction and operation. The mitigation that would be proposed for the Dry Cooling Alternative would be the same as that proposed for the proposed project (staff and MDAQMD recommended conditions of certification), with the exception of the deletion of the District's cooling tower conditions **AQ-15** to **AQ-22**.

C.1.7 NO ACTION ALTERNATIVES

C.1.7.1 NO ACTION ON PROPOSED PROJECT APPLICATION AND ON CDCA LAND USE PLAN AMENDMENT

Under this alternative, the proposed GSEP would not be approved by the CEC 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 reducing fossil fuel use and greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation (see **Appendix Air-1 - Greenhouse Gas Emissions** for details).

If the proposed project is not approved, renewable projects would likely be developed on other sites in Riverside County, the Colorado Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, as shown on **Cumulative Impacts Figure 1** and in **Table 1**, several dozen solar and wind development applications for use of BLM land have been submitted for approximately one million acres of the California Desert Conservation Area. Additional BLM land in Nevada and Arizona also has applications for solar and wind projects.

C.1.7.2 NO ACTION ON PROPOSED PROJECT AND AMEND THE CDCA LAND USE PLAN TO MAKE THE AREA AVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed GSEP would not be approved by the CEC 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 a result, air pollutant emissions and impacts would result from the construction and operation of the solar technology and would likely be similar to the air quality impacts from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, the benefits of the proposed project in displacing fossil fuel fired generation and reducing associated pollutant emissions could occur with a different solar technology at this site and therefore with this alternative. As such, this No Project/No Action Alternative could result in air quality impacts and benefits similar to the impacts under the proposed project.

C.1.7.3 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAND USE PLAN TO MAKE THE AREA UNAVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed GSEP would not be approved by the CEC 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, the air quality of the site is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in air quality impacts under the proposed project nor would it result in the air quality benefits from 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.1.8 CUMULATIVE IMPACTS

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

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

Thus, much of the preceding discussion is concerned with cumulative impacts. The “Existing Ambient Air Quality” subsection describes the air quality background in the Riverside County portion of the Mojave Desert Air Basin, including a discussion of historical ambient levels for each of the significant criteria pollutants. The “Construction Impacts and Mitigation” subsection discusses the proposed project’s contribution to the local existing background caused by project construction. The “Operation Impacts and

Mitigation" subsection discusses the proposed project's contribution to the local existing background caused by project operation. The following subsection includes two additional analyses:

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

C.1.8.1 SUMMARY OF PROJECTIONS

The Riverside County portion of the MDAB is designated as attainment for all federal ambient air quality standards and the state CO, NO_2, SO_2 and PM10 standards, but is designated as non-attainment for State ozone and PM10 standards.

Ozone

Since a portion of San Bernardino County in the Mojave Desert Air Basin is currently classified as non-attainment for the federal 8-hour ozone standard north and west of the project site, the District is required to prepare and adopt an ozone attainment plan for submittal to the U.S. EPA describing how it will attain the federal 8- hour standard. The District completed this plan in 2008. The project is not specifically subject to the provisions in the federal attainment plan and the site is outside of the non-attainment area.

The District is required to prepare and adopt a state ozone attainment plan for submittal to ARB. The latest state ozone attainment plan was adopted by MDAQMD in 2004. The MDAQMD 2004 Ozone Attainment Plan contains attainment plans for both federal (for areas within San Bernardino County) and state ozone standards. The MDAQMD did not propose to adopt any additional control measures as part of the 2004 Plan. Additionally, while there are no additional control measures for direct ozone precursor reduction as part of the federal 2008 attainment plan, MDAQMD is committed to adopt all applicable Federal Reasonably Available Control Technology (RACT) rules it proposed in 8-hour Reasonably Available Control Technology – State Implementation Plan Analysis (RACT SIP Analysis) in 2006. In addition, the MDAQMD updated and indentified new measures in 2007, which will be adopted through 2014, as the State of California mandates all feasible measures. The RACT rules and other new measures do not impact the GSEP emission sources as proposed.

Particulate Matter

Since a portion of San Bernardino County in the Mojave Desert Air Basin is currently classified as non-attainment for the federal PM10 standards north and west of the project site, the District is required to prepare and adopt an attainment plan for submittal to the U.S. EPA describing how it will achieve attainment with the federal PM10 standards. However, the proposed project site that is in Riverside County is outside of the non-attainment area and is not subject to the provisions in the federal attainment plan. There is no legal requirement for air districts to provide plans to attain the state PM10 standard, so air districts have not developed such plans. Therefore, there are no

air quality management plan particulate emission control measures that are applicable to the proposed project.

As a solar power generation facility, the direct air pollutant emissions from power generation are negligible and the emission source would be limited to auxiliary equipment and maintenance activities. The emissions from the proposed project would be minimal compared to the other power generation facilities, and with staff's recommended construction and operation mitigation measures it is unlikely that the proposed project would have significant impact on particulate matter emissions.

Summary of Conformance with Applicable Air Quality Plans

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

C.1.8.2 LOCALIZED CUMULATIVE IMPACTS

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

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

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

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

The applicant, in consultation with MDAQMD and SCAQMD, confirmed that there are no projects within a six miles radius from the Genesis Solar project site that are under construction or have received permits to be built or operate in the foreseeable future. Therefore, it has been determined that no stationary sources requiring a cumulative modeling analysis exist within a six mile radius of the proposed project site. However, there are several pending solar and wind projects in the I-10 corridor area between Desert Center and Blythe including two thermal solar projects, the Blythe Solar Power Project and Palen Solar Power Project siting cases, which are currently being evaluated by the Energy Commission and BLM. This potential for significant additional development within the air basin and corresponding increase in air basin emissions is a major part of staff's rationale for recommending Conditions of Certification **AQ-SC6** and **AQ-SC7** that are designed to mitigate the proposed project's cumulative impacts by reducing the dedicated on-site vehicle emissions and fugitive dust emissions during site operation. With these recommended CEQA-only mitigation measures, staff has concluded that the CEQA cumulative air quality impacts are less than significant.

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

C.1.9 COMPLIANCE WITH LORS

The Mojave Desert Air Quality Control District issued a Preliminary Determination of Compliance (PDOC) for the GSEP on February 18, 2010 (MDAQMD 2010a), and completed a 30 day notice period. The District will issue a Final Determination of Compliance after resolution of all comments received on the PDOC and obtaining additional information from the applicant. Compliance with all District rules and regulations was demonstrated to the District's satisfaction in the PDOC. The District's PDOC conditions are presented in the Conditions of Certification (**AQ-1** to **AQ-40**).

Staff submitted an official PDOC comment letter on March 8, 2010 (CEC 2010h) and expects that the FDOC will contain revisions to conditions due to Energy Commission, applicant, or third party comments. Staff will provide any revised FDOC findings or conditions of certification in a Supplemental Staff Assessment addendum after receipt of the FDOC.

C.1.9.1 FEDERAL

The District is responsible for issuing the federal New Source Review (NSR) permit and has been delegated enforcement of the applicable New Source Performance Standard (Subparts Dc and IIII). However, this proposed project does not require a federal NSR or Title V permit and this proposed project would not require a PSD permit from U.S.EPA prior to initiating construction.

The proposed project requires the approval of a federal agency (BLM), but is located in an area that is in attainment or unclassified with all federal ambient air quality standards. Therefore, the proposed project is not subject to the general conformity regulations (40 CFR Part 93).

C.1.9.2 STATE

The project owner will demonstrate that the proposed project will comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury, with the issuance of the District's Final Determination of Compliance and the Energy Commission's affirmative finding for the project.

The emergency generator and fire water pump engines are also subject to the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. This measure limits the types of fuels allowed, established maximum emission rates, and establishes recordkeeping requirements. The proposed Tier 2 emergency engine and Tier 3 fire water pump engine meet the current emission limit requirements of this measure. This measure would also limit the engines' testing and maintenance operation to no more than 50 hours per year.

C.1.9.3 LOCAL

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

The applicant provided an air quality permit application to the MDAQMD and the District issued a PDOC on February 18, 2010 (MDAQMD 2010a). The PDOC states that the proposed project is expected to comply with all applicable District rules and regulations. The DOC evaluates whether and under what conditions the proposed project would comply with the District's applicable rules and regulations, as described below.

Regulation II – Permits

Rule 201 and 203 – Permit to Construct and Permit to Operate

Rule 201 establishes the emission source requirements that must be met to obtain a Permit to Construct. Rule 203 prohibits use of any equipment or the use of which may emit air contaminants without obtaining Permit to Operate. The applicant has complied with this rule by submitting the AFC and District permit applications materials.

Regulation IV – Prohibitions

Rule 401 - Visible Emissions

This rule limits visible emissions from emissions sources, including stationary source exhausts and fugitive dust emission sources. Compliance with this rule is expected. In the PDOC, the District has determined that the facility is expected to comply with this rule.

Rule 402 - Nuisance

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

Rule 403 - Fugitive Dust

This rule limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and manmade conditions resulting in wind erosion. With the implementation of recommended staff conditions **AQ-SC3**, **AQ-SC4**, and **AQ-SC7** the facility is expected to comply with this rule.

Rule 404 - Particulate Matter Concentration

The rule limits particulate matter (PM) emissions based on the volume discharge rate. The GSEP stationary sources subject to this rule (HTF heaters and emergency engines) would comply with the PM concentration limits of this regulation.

Rule 406 - Specific Contaminants

The rule prohibits sulfur emissions, calculated as SO_2, in excess of 500 ppmv. Compliance with this rule is assured with the required use of pipeline quality natural has for the boilers and heaters and California low sulfur diesel fuel for the emergency generator and fire pump engines.

Rule 407 - Liquid and Gaseous Air Contaminants

The rule prohibits carbon monoxide emissions in excess of 2,000 ppmv. The heaters and emergency generator and fire pump engines would have CO emissions well below this concentration limit. Compliance with this rule is expected.

Rule 409 - Fuel Burning Equipment - Combustion Contaminants

This rule limits discharge into the atmosphere from fuel burning equipment combustion contaminants exceeding in concentration at the point of discharge, 0.1 grain per cubic foot of gas calculated to 12 percent of carbon dioxide (CO_2) at standard conditions. The GSEP stationary sources would have particulate concentrations below limit of this rule.

Rule 431 - Sulfur Content of Fuels

The rule prohibits the burning of gaseous fuel with a sulfur content of more than 800 ppm and liquid fuel with a sulfur content of more than 0.5 percent sulfur by weight. The facility is expected to comply with this rule. Compliance with this rule is assured with the required use of pipeline quality natural gas and California low sulfur diesel fuel for the emergency engines.

Regulation IX – Standards of Performance for New Stationary Sources

Rule 900 – Standard of Performance For New Stationary Source (NSPS)

This rule incorporates the Federal NSPS (40 CFR 60) rules by reference. The proposed boilers are subject to subpart Dc. The District conditions would ensure compliance with the requirements of this rule.

The proposed Tier 2 and Tier 3 engines meet the current emission limit requirements of NSPS Subpart IIII. The exact model and size of the engines are only estimated at this time and it is uncertain exactly when the emergency engines would be purchased and whether Tier 4 engine emission limits may apply at that time. So, staff has added a requirement to the verification of District Condition of Certification (**AQ-31** and **AQ-40**) to require the applicant to provide documentation that demonstrates that the engines purchased meet the appropriate NSPS standards for new engines at the time of purchase.

Regulation XIII – New Source Review

Rule 1303 – New Source Review

This rule requires implementation of BACT for any emission source unit which emits or has the potential to emit 25 lbs/day or more and requires offsets if specific annual emission limits are exceeded. The PDOC concluded that the emergency engines trigger

BACT and the engines complied. The other stationary sources did not trigger BACT but would meet BACT requirements based on the applicant's proposed controls. The PDOC concluded that offsets were not required for the proposed project.

Rule 1306 – Electric Energy Generating Facilities

Describes actions to be taken for permitting of power plants. Compliance with this rule would be achieved with the completion of the FDOC.

C.1.10 NOTEWORTHY PUBLIC BENEFITS

Renewable energy facilities, such as GSEP, are needed to meet California's mandated renewable energy goals. While there are no local area air quality public benefits[9] resulting from the proposed project, it would indirectly reduce criteria pollutant emissions within the Southwestern U.S. by reducing fossil fuel fired generation.

C.1.11 RESPONSE TO AGENCY AND PUBLIC COMMENTS

There have been no agency comments received on staff's Air Quality section.

California Unions for Renewable Energy stated that the staff analysis was incomplete without a final Determination of Compliance (FDOC). However, staff has incorporated its understanding of District requirements based upon the expected content of the FDOC. As stated in this staff assessment, if the FDOC contains information that requires a different analytical treatment, staff will provide a Supplemental Staff Assessment addendum.

There were no other public comments to the Air Quality section.

The applicant has provided comments (TT 2010n) that have been addressed, in some cases with minor modifications, as considered acceptable by staff.

C.1.12 MITIGATION MEASURES/ PROPOSED CONDITIONS OF CERTIFICATION

C.1.12.1 STAFF CONDITIONS OF CERTIFICATION

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4** and **AQ-SC5** for the entire project site and linear facility construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction

[9] Air quality benefits should not be confused with greenhouse gas/climate change benefits, which are discussed in Appendix AIR-1.

activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the CPM for approval, the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM Delegates.

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

Verification: At least 30 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The CPM will notify the project owner of any necessary modifications to the plan within 15 days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the CPM in each Monthly Compliance Report that demonstrates compliance with the Air Quality Construction Mitigation Plan (AQCMP) mitigation measures for the purposes of preventing all fugitive dust plumes that would not comply with the performance standards identified in **AQ-SC4** from leaving the project site. Any deviation from the AQCMP mitigation measures shall require prior CPM notification and approval.

Verification: The AQCMM shall provide the CPM a Monthly Compliance Report to include the following to demonstrate control of fugitive dust emissions:

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

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

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

The following fugitive dust mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

a. The main access roads through the facility to the power block areas will be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved or treated prior to taking initial deliveries.

b. All unpaved construction roads and unpaved operation and maintenance site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be as efficient as or more efficient for fugitive dust control than ARB approved soil stabilizers, and that shall not increase any other environmental impacts, including loss of vegetation to areas beyond where the soil stabilizers are being applied for dust control. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading (consistent with **BIO-7**); and after active construction activities shall be stabilized with a non-toxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods, in order to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

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

d. Visible speed limit signs shall be posted at the construction site entrances.

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

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

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

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

i. Construction areas adjacent to any paved roadway below the grade of the surrounding construction area or otherwise directly impacted by sediment from site drainage shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.

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

k. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept as needed (less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways.

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

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

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

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (A) off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing the additional mitigation measures described in the verification below and how they will be implemented to meet these fugitive dust control performance standards.

Verification: The AQCMM shall provide the CPM a Monthly Compliance Report to include:

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

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

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

The AQCMP shall include the following additional mitigation measure implementation procedures that will be used to ensure that the performance standards of this condition are met:

The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that visible dust plumes as defined above are observed:

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

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

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM before that time.

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

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

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

B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and

C. Any other documentation deemed necessary by the CPM, and the AQCMM to verify compliance with this condition, including any District permits necessary for temporary stationary diesel engines, or ARB certification for state registered portable equipment. Such information may be provided via electronic format or disk at the project owner's discretion.

The following off-road diesel construction equipment mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.

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

b. All construction diesel engines with a rating of 50 hp or higher and lower than 750 hp shall meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort to the satisfaction of the CPM that is certified by the on-site AQCMM demonstrates that such engine is not available for a particular item of equipment. Engines larger than 750 hp shall meet Tier 2 engine standards. In the event that a Tier 3 engine is not available for any off-road equipment larger than 100 hp and smaller than 750 hp, that equipment shall be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels unless certified by engine manufacturers or the

on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is “not practical” for the following, as well as other, reasons.

1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 2 equivalent emission levels and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

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

3. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not practical.

c. The use of a retrofit control device may be terminated immediately, provided that the CPM is informed within 10 working days of the termination and that a replacement for the equipment item in question meeting the controls required in item “b” occurs within 10 days of termination of the use, if the equipment would be needed to continue working at this site for more than 15 days after the use of the retrofit control device is terminated, if one of the following conditions exists :

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

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

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

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

d. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (b) above shall be properly maintained and the engines tuned to the engine manufacturer’s specifications.

e. All diesel heavy construction equipment shall not idle for more than five minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement.

f. Construction equipment will employ electric motors when feasible.

AQ-SC6 The project owner, when obtaining dedicated on-road or off-road vehicles for mirror washing activities and other facility maintenance activities, shall only obtain vehicles that meet California on-road vehicle emission

standards or appropriate U.S.EPA/California off-road engine emission standards for the latest model year available when obtained.

Verification: At least 30 days prior to the start commercial operation, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report.

AQ-SC7 The project owner shall provide a site Operations Dust Control Plan, including all applicable fugitive dust control measures identified in the verification of **AQ-SC3** that would be applicable to minimizing fugitive dust emission creation from operation and maintenance activities and preventing all fugitive dust plumes that would not comply with the performance standards identified in **AQ-SC4** from leaving the project site that:

A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and

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

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

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

Verification: At least 30 days prior to start of commercial operation, the project owner shall submit to the CPM for review and approval a copy of the site Operations Dust Control Plan that identifies the dust and erosion control procedures, including

effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. Within 60 days after commercial operation, the project owner shall provide to the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training manual that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.

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

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

Verification: The project owner shall submit any ATC, PTO, and proposed air permit modifications to the CPM within 5 working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

C.1.12.2 DISTRICT CONDITIONS

DISTRICT PRELIMINARY DETERMINATION OF COMPLIANCE CONDITIONS (MDAQMD 2010a)

District conditions **AQ-1** through **AQ-40** are CEQA-only required conditions.

Application No. 00010788 and 00010789 (Two - 30 MMBtu/hr Natural Gas Fired Auxiliary Boiler)

EQUIPMENT DESCRIPTION:

Two 30 MMBtu/hr natural gas boilers with low-NOx burner systems.

AQ-1 Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

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

AQ-2 This equipment shall be exclusively fueled with natural gas and shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

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

AQ-3 Emissions from this equipment shall not exceed the following hourly emission limits at any firing rate, verified by fuel use and annual compliance tests:

a. NOx as NO_2:

1. 0.082 lb/hr operating at 25% load (based on 9.0 ppmvd corrected to 3% O_2 and averaged over one hour)

2. 0.330 lb/hr operating at 100% load (based on 9.0 ppmvd corrected to 3% O_2 and averaged over one hour)

b. CO:

1. 0.141 lb/hr operating at 25% load (based on 50 ppmvd corrected to 3% O_2 and averaged over one hour)

2. 0.563 lb/hr operating at 100% load (based on 50 ppmvd corrected to 3% O_2 and averaged over one hour)

c. VOC as CH_4:

1. 0.022 lb/hr operating at 25% load

2. 0.088 lb/hr operating at 100% load

d. SOx as SO_2:

1. 0.002 lb/hr operating at 25% load

2. 0.008 lb/hr operating at 100% load

e. PM10:

1. 0.038 lb/hr operating at 25% load

2. 0.150 lb/hr operating at 100% load

Verification: As part of the Annual Compliance Report, the project owner shall include information demonstrating compliance with boiler operating emission rates.

AQ-4 The daily emission of the following pollutants CO, NOx (as NO2) and SOx (as SO2) as well as O2 (a diluent gas) shall be monitored using a Continuous Emissions Monitoring System (CEMS). This system shall be operating at all times in accordance with the District approved monitoring plan.

The following are the acceptability testing requirements for the CEMS:

a. For SO2 and NOx CEMS - Performance Specification 2 of 40 CFR 60 Appendix B.

b. For O2 CEMS - Performance Specification 3 of 40 CFR 60 Appendix B.

c. For CO CEMS - Performance Specification 4 of 40 CFR 60 Appendix B.

d. For quality assurance - Performance Specification 40 CFR 60 Appendix F.

Verification: As part of the Annual Compliance Report, the project owner shall include CEMS information demonstrating compliance with boiler operating emission rates.

AQ-5 This equipment shall not be operated for more than 1,000 hours per rolling twelve month period and more than 14 hours per calendar day.

Verification: The project owner shall submit to the CPM the boiler hours of use records demonstrating compliance with this condition as part of the Annual Operation Report.

AQ-6 The project owner shall maintain an operations log for this equipment on-site and current for a minimum of five (5) years, and said log shall be provided to District personnel on request. The operations log shall include the following information at a minimum:

a. Total operation time (hours per day, hours per month, and hours per rolling twelve month period);

b. Maximum hourly, maximum daily, and total calendar year emissions of NOx, CO, PM10, VOC and SOx (including calculation protocol); and,

c. Any permanent changes made to the equipment that would affect air pollutant emissions, and indicate when changes were made.

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

AQ-7 The project owner shall perform initial compliance tests on this equipment in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District within 180 days of initial start up:

a. NOx as NO_2 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 19 and 20).

b. VOC as CH_4 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 25A and 18).

c. SOx as SO_2 in ppmvd at 3% oxygen and lb/hr.

d. CO in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Method 10).

e. PM10 in mg/m^3 at 3% oxygen and lb/hr (measured per USEPA Reference Methods 5 and 202 or CARB Method 5).

f. Flue gas flow rate in dscf per minute.

g. Opacity (measured per USEPA reference Method 9).

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 180 days of initial start up.

AQ-8 The project owner shall perform annual compliance tests on this equipment in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District no later than six weeks prior to the expiration date of this permit. The following compliance tests are required:

a. NOx as NO_2 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 19 and 20).

b. VOC as CH_4 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 25A and 18).

c. SOx as SO_2 in ppmvd at 3% oxygen and lb/hr.

d. CO in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Method 10).

e. PM10 in mg/m^3 at 3% oxygen and lb/hr (measured per USEPA Reference Methods 5 and 202 or CARB Method 5).

f. Flue gas flow rate in dscf per minute.

g. Opacity (measured per USEPA reference Method 9).

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within the timeframe required by this condition.

Application No. 00010842 and 00010843 (Two – HTF Ullage Expansion Tank)

EQUIPMENT DESCRIPTION:

Two HTF ullage/expansion tanks.

AQ-9 This tank stores HTF, specifically the condensable fraction of the vapors vented from the ullage system.

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

AQ-10 This tank must be properly maintained at all times.

Verification: The project owner shall make the site available for inspection of HTF piping Inspection and Maintenance Program records (**AQ-13**) and HTF system equipment by representatives of the District, ARB, and the Energy Commission.

AQ-11 This tank shall be operated at all times under a nitrogen blanket.

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

AQ-12 The ullage vent system shall be vented to control system with at least 99% control efficiency for VOC and toxic substances.

Verification: The project owner shall provide the District and CPM ullage vent control system manufacturer guarantee data showing compliance with this condition at least 30 days prior to the installation of the ullage vent system control system.

AQ-13 Inspect the tanks and distribution system (valves, flanges, pump seals, etc.) for the presence of leaks daily and repair or shutdown as soon as possible.

Verification: The project owner shall establish an inspection and maintenance program that that at a minimum includes the following:

A. All pumps, compressors and pressure relief devices (pressure relief valves or rupture disks) shall be electronically, audio, or visually inspected once every operating period.

B. All accessible valves, fittings, pressure relief devices (PRDs), hatches, pumps, compressors, etc. shall be inspected quarterly using a leak detection device such as a Foxboro OVA 108 calibrated for methane.

C. VOC leaks greater than 100-ppmv shall be tagged (with date and concentration) and repaired within seven calendar days of detection.

D. VOC leaks greater than 10,000-ppmv shall be tagged and repaired within 24-hours of detection.

E. The project owner shall maintain a log of all VOC leaks exceeding 10,000-ppmv, including location, component type, and repair made.

F. The project owner shall maintain record of the amount of HTF replaced on a monthly basis for a period of five years.

G. Any detected leak exceeding 100-ppmv and not repaired in 7-days and 10,000-ppmv not repaired within 24-hours shall constitute a violation of the District's Authority to Construct (ATC)/Permit to Operate (PTO).

H. Pressure sensing equipment shall be installed that will be capable of sensing a major rupture or spill within the HTF network.

The inspection and maintenance plan shall be submitted to the CPM for review and approval at least 30 days before taking delivery of the HTF. The project owner shall make the site available for inspection of HTF piping Inspection and Maintenance

Program records and HTF system equipment by representatives of the District, ARB, and the Energy Commission.

AQ-14 If current non-criteria substances become regulated as toxic or hazardous substances and are used in this equipment, the project owner shall submit to the District a plan demonstrating how compliance will be achieved and maintained with such regulations.

Verification: The project owner shall submit a compliance plan of the toxic or hazardous substances for District approval and CPM review if current non-criteria substances in the HTF become regulated as toxic or hazardous substances.

Application No. 00010787 and 00010841 (Two Cooling Towers)

EQUIPMENT DESCRIPTION:

Two 7-cell cooling towers with drift eliminator rate of 0.0005% and water circulation rate of 94,623 gpm.

AQ-15 Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

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

AQ-16 This equipment shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

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

AQ-17 The drift rate shall not exceed 0.0005 percent with a maximum circulation rate of 94,623 gallons per minute. The maximum hourly PM10 emission rate shall not exceed 2.36 pounds per hour, as calculated per the written District-approved protocol.

Verification: The manufacturer guarantee data for the drift eliminator, showing compliance with this condition, shall be provided to the CPM and the District 30 days prior to cooling tower operation. As part of the Annual Compliance Report the project owner shall include information on operating emission rates to demonstrate compliance with this condition.

AQ-18 The project owner shall perform weekly tests of the blow-down water total dissolved solids (TDS). The TDS shall not exceed 5,000 ppmv on a calendar monthly basis. The project owner shall maintain a log which contains the date and result of each blow-down water test in TDS ppm, and the resulting mass emission rate. This log shall be maintained on site for a minimum of five (5) years and shall be provided to District personnel on request.

Verification: The cooling tower recirculation water TDS content test results shall be provided to representatives of the District, ARB, and the Energy Commission upon request.

AQ-19 The project owner shall conduct all required cooling tower water tests in accordance with a District-approved test and emissions calculation protocol. Thirty (30) days prior to the first such test the project owner shall provide a written test and emissions calculation protocol for District review and approval.

Verification: The project owner shall provide an emissions calculation and water sample testing protocol to the District for approval and CPM for review at least 30 days prior to the first cooling tower water test.

AQ-20 This equipment shall not be operated for more than 3,200 hours per rolling twelve month period and more than 15 hours per calendar day.

Verification: The project owner shall submit to the CPM the cooling tower operating data demonstrating compliance with this condition as part of the Annual Operation Report.

AQ-21 The project owner shall maintain an operations log for this equipment on-site and current for a minimum of five (5) years, and said log shall be provided to District personnel on request. The operations log shall include the following information at a minimum:

a. Total operation time (hours per day, hours per month, and hours per rolling twelve month period); and

b. The date and result of each blow-down water test in TDS ppm, and the resulting mass emission rate.

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

AQ-22 A maintenance procedure shall be established that states how often and what procedures will be used to ensure the integrity of the drift eliminators. This procedure is to be kept onsite and available to District personnel on request.

Verification: The project owner shall make available at request the written drift eliminator maintenance procedures for inspection by representatives of the District, ARB, and the Energy Commission.

Application No. 00010790 and 00010791 (Two - 1,341 HP Emergency IC Engine)

EQUIPMENT DESCRIPTION:

Two - Tier II 1,341 HP diesel fueled emergency generator engines, each driving a generator.

AQ-23 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound

engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

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

AQ-24 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

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

AQ-25 A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time. (Title 17 CCR §93115.10(e)(1)).

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

AQ-26 This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 50 hours per year for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.

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

AQ-27 The project owner shall maintain a operations log for this unit current and on-site, either at the engine location or at a on-site location, for a minimum of two (2) years, and for another year where it can be made available to the District staff within 5 working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the project owner may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-24** and **AQ-26** in the Annual Compliance Report, including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-28 This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.

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

AQ-29 This engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.

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

AQ-30 This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent shall govern.

Verification: Not necessary.

AQ-31 This unit is subject to the requirements of the Federal National Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).

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

Application No. 00010792 and 00010793 (Two - 315 HP Emergency IC Engine)

EQUIPMENT DESCRIPTION:

Two - Tier III 315 HP diesel fueled emergency fire pump engines, each driving a fire suppression water pump.

AQ-32 This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

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

AQ-33 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.

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

AQ-34 A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time. (Title 17 CCR §93115.10(e)(1)).

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

AQ-35 This unit shall be limited to use for emergency power, defined as in response to a fire or due to low fire water pressure. In addition, this unit shall be operated no more than 50 hours per year for testing and maintenance, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies. {Title 17 CCR 93115.3(n)}

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

AQ-36 The project owner shall maintain an operations log for this unit current and on-site, either at the engine location or at a on-site location, for a minimum of two (2) years, and for another year where it can be made available to

the District staff within 5 working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing);

c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,

d. Fuel sulfur concentration (the project owner may use the supplier's certification of sulfur content if it is maintained as part of this log).

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-33** and **AQ-35** in the Annual Compliance Report, including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-37 This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.

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

AQ-38 This engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.

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

AQ-39 This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the requirements of the ATCM shall govern.

Verification: Not necessary.

AQ-40 This unit is subject to the requirements of the Federal National Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).

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

C.1.13 CONCLUSIONS

Staff has made the following conclusions about the Genesis Solar Energy Project:

- The proposed project would not have the potential to exceed PSD emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause adverse air quality impacts under NEPA. However, without adequate fugitive dust mitigation, the proposed project would have the potential to exceed the PSD emission levels for PM10 during construction, and could cause potential localized exceedances of the PM10 NAAQS during construction. Recommended Conditions of Certification **AQ-SC1** through **AQ-SC4** would adequately mitigate these potentially adverse impacts.
- The proposed project would comply with applicable District Rules and Regulations and staff recommends the inclusion of the District's PDOC conditions as Conditions of Certification **AQ-1** through **AQ-40**
- If left unmitigated, the proposed project's construction activities would likely contribute to significant CEQA adverse PM10 and ozone impacts. Staff recommends **AQ-SC1** to **AQ-SC5** to mitigate the potential impacts.
- The proposed project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards. Therefore, the project-direct operational NOx, SOx, PM2.5 and CO emission impacts are not CEQA significant.
- The proposed project's direct and indirect, or secondary emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely CEQA significant if unmitigated. Therefore, staff recommends **AQ-SC6** to mitigate the onsite maintenance vehicle emissions and **AQ-SC7** to mitigate the operating fugitive dust emissions to ensure that the potential ozone and PM10 CEQA impacts are mitigated to less than significant over the life of the project.
- The proposed project would be consistent with the requirements of SB 1368 and the Emission Performance Standard for greenhouse gases (see **Appendix Air-1**).

C.1.14 REFERENCES

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ACRONYMS

AAQS	Ambient Air Quality Standard
ACC	Air Cooled Condenser
AERMOD	ARMS/EPA Regulatory Model
AFC	Application for Certification
APCO	Air Pollution Control Officer
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
ASOS	Automated Surface Observing Systems
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
bhp	brake horsepower
BLM	Bureau of Land Management
Btu	British Thermal Unit
CARB	California Air Resources Board
CCR	California Code of Regulations
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPM	(CEC) Compliance Project Manager
DPM	Diesel Particulate Matter
Degrees F	Degrees Fahrenheit
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERC	Emission Reduction Credit
FDOC	Final Determination Of Compliance
GHG	Greenhouse Gas
GSEP	Genesis Solar Energy Project
H_2S	Hydrogen Sulfide

HTF	Heat Transfer Fluid
hp	horsepower
HSC	Health and Safety Code
lbs	Pounds
LORS	Laws, Ordinances, Regulations and Standards
LLC	Limited Liability Company
MCR	Monthly Compliance Report
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
μg/m3	microgram per cubic meter
mg/m3	milligrams per cubic meter
MMBtu/hr	Million British Thermal Units per Hour
MW	Megawatts (1,000,000 Watts)
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Protection Act
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen or Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
O_2	Oxygen
O_3	Ozone
OLM	Ozone Limiting Method
PDOC	Preliminary Determination Of Compliance
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSD	Prevention of Significant Deterioration
PTC	Permit to Construct
PTO	Permit to Operate
RSA	Revised Staff Assessment (this document)
SA/DEIS	Staff Assessment/Draft Environmental Impact Statement
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District

scf	standard cubic feet
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_4	Sulfate
SOx	Oxides of Sulfur
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
tpy	tons per year
U.S.EPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
WC	Weather Channel

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APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Testimony of William Walters, P.E.

SUMMARY OF CONCLUSIONS

The Genesis Solar Energy Project (GSEP) is a proposed addition to the state's electricity system. GSEP is a solar concentrating thermal power plant, which would utilize parabolic trough solar thermal technology to solar heat a heat transfer fluid (HTF). This hot HTF would be used to generate steam in a solar steam generator. The proposed project is comprised of two solar plants, each of which would have 125-MW capacity, totaling 250 MW. As a solar project, GSEP would emit considerably less greenhouse gas (GHG) than the existing statewide average GHG emissions per unit of generation and would emit considerably less GHG emissions per unit of generation than existing fossil fuel fired power plants providing generation to California, and thus would contribute to continued reduction of GHG emissions in the interconnected California and the western United States electricity systems.

While GSEP would emit some GHG emissions, the contribution of GSEP to the system build-out of renewable resources to meet the goals of the Renewable Portfolio Standard (RPS) in California would result in a net cumulative reduction of energy generation and GHG emissions from new and existing fossil-fired electricity resources. Electricity is produced by operation of inter-connected generation resources. Operation of one power plant, like GSEP, affects all other power plants in the interconnected system. GSEP would be a must take facility and its operation would affect the overall electricity system operation and GHG emissions in several ways:

- GSEP would provide low-GHG, renewable generation.
- GSEP would facilitate to some degree the replacement high GHG emitting (e.g., out-of-state coal) electricity generation that must be phased out to meet the State's 2006 Emissions Performance Standard.
- GSEP could facilitate to some extent the replacement of generation provided by aging fossil-fired power plants that use once-through cooling.

These system impacts would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, staff concludes that the proposed project would result in a cumulative overall reduction in GHG emissions from power plants, does not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant.

Staff concludes that the short-term minor emission of greenhouse gases during construction that are necessary to create this new, low GHG-emitting power generating facility would be sufficiently reduced by "best practices" and would be more than offset by GHG emission reductions during operation. Thus, construction GHG emissions would not be CEQA significant.

The Genesis Solar Energy Project, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance

Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

The California Air Resources Board (ARB) has promulgated regulations for mandatory GHG emission reporting to comply with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a). The Genesis Solar Energy Project, which solely generates electricity from solar power, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities [CCR Title 17 §95101(c)(1)]. However, the proposed project may be subject to future reporting requirements and GHG reductions or trading requirements as additional state or federal GHG regulations are developed and implemented.

INTRODUCTION

Greenhouse gas (GHG) emissions are not criteria pollutants, but they are discussed in the context of cumulative impacts. However, on April 2, 2007, the U.S. Supreme Court found that GHGs are pollutants that must be covered by the federal Clean Air Act. In response, on September 30, 2009, the U.S. Environmental Protection Agency proposed to apply Prevention of Significant Deterioration (PSD) requirements to facilities whose carbon dioxide-equivalent emissions exceed 25,000 tons per year (U.S.EPA 2009c). The rule making is not finalized, but the GHG emissions for GSEP are not expected to exceed this amount.

The state has demonstrated a clear willingness to address global climate change through research, adaptation and inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

Generation of electricity can produce greenhouse gases with the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. For fossil fuel-fired power plants, the GHG emissions include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). For solar energy generation projects the stationary source GHG emissions are much smaller than fossil fuel-fired power plants, but the associated maintenance vehicle emissions are higher. Other sources of GHG emissions include sulfur hexafluoride (SF_6) from high voltage equipment and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very high global warming potentials.

Global warming potential is a relative measure, compared to carbon dioxide, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO2E) metric tonnes (MT) for ease of comparison.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

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

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

Applicable Law	Description
Federal	
40 Code of Federal Regulations Part 98	This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2 equivalent emissions per year.
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resource Board (ARB) to enact standards that will reduce GHG emission to 1990 levels by 2020. Electricity production facilities will be regulated by the ARB.
California Code of Regulations, tit. 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 $MTCO_2$/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO_2/MWh).

GLOBAL CLIMATE CHANGE AND ELECTRICITY PRODUCTION

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

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p.5). In 2003, the Energy Commission recommended that the state require reporting of greenhouse gases (GHG) or global climate change[10] emissions as a condition of state licensing of new electric generating facilities (CEC 2003, IEPR p. 42). In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). It requires the California Air Resources Board (ARB) to adopt standards that will reduce statewide GHG emissions to statewide GHG emissions levels in 1990, with such

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

reductions to be achieved by 2020.[11] To achieve this, ARB has a mandate to define the 1990 emissions level and achieve the maximum technologically feasible and cost-effective GHG emission reductions.

The ARB adopted early action GHG reduction measures in October 2007, adopted mandatory reporting requirements and the 2020 statewide target in December 2007, and adopted a statewide scoping plan in December 2008 to identify how emission reductions will be achieved from major sources of GHG via regulations, market mechanisms, and other actions. ARB staff is developing regulatory language to implement its plan and holds ongoing public workshops on key elements of the recommended GHG reduction measures, including market mechanisms (ARB 2006). The regulations must be effective by January 1, 2011 and mandatory compliance commences on January 1, 2012. The mandatory reporting requirements are effective for electric generating facilities with a nameplate capacity equal or greater than 1 megawatt (MW) capacity if their emissions exceed 2,500 metric tonnes per year. The due date for initial reports by existing facilities was June 1, 2009.

Examples of strategies that the state might pursue for managing GHG emissions in California, in addition to those recommended by the Energy Commission and the Public Utilities Commission, were identified in the California Climate Action Team's Report to the Governor (CalEPA 2006). The scoping plan approved by ARB in December 2008 builds upon the overall climate policies of the Climate Action Team report and shows the recommended strategies to achieve the goals for 2020 and beyond. Some strategies focus on reducing consumption of petroleum across all areas of the California economy. Improvements in transportation energy efficiency (fuel economy), land use planning, and alternatives to petroleum-based fuels are slated to provide substantial reductions by 2020 (CalEPA 2006). The scoping plan includes a requirement for 33% of California's electrical energy to be provided from renewable sources by 2020 (implementing California's 33% RPS goal), aggressive energy efficiency targets, and a cap-and-trade system that includes the electricity sector (ARB 2008b).

It is likely that GHG reductions mandated by ARB will not be uniform across emitting sectors, in that reductions will be based on cost-effectiveness (i.e., the greatest effect for the least cost). For example, the ARB proposes a 40 percent reduction in GHG from the electricity sector, even though that sector currently only produces about 25 percent of the state's GHG emissions. In response, in September 2008 the Energy Commission and the Public Utilities Commission provided recommendations (CPUC 2008) to ARB on how to achieve such reductions through both programmatic and regulatory approaches, and identified regulation points should ARB decide that a multi-sector cap and trade system is warranted.

The Energy Commission's *2007 Integrated Energy Policy Report* (IEPR) also addressed climate change within the electricity, natural gas, and transportation sectors (CEC 2007). For the electricity sector, it recommended such approaches as pursuing all cost-effective energy efficiency measures and meeting the Governor's stated goal of a 33 percent renewable portfolio standard. The Energy Commission's *2009 Integrated*

[11] Governor Schwarzenegger has also issued Executive Order S-3-05 establishing a goal of 80% below 1990 levels by 2050.

Energy Policy Report continues to emphasize the importance of meeting greenhouse gas emissions reduction goals along with other important statewide issues such as backing out use of once-through cooling in coastal California power plants (CEC 2009d).

SB 1368[12], enacted in 2006, and regulations adopted by the Energy Commission and the Public Utilities Commission pursuant to the bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Emission Performance Standard of 0.500 metric tonnes CO_2 per megawatt-hour[13] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 Emission Performance Standard (EPS) applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California.[14] If a project, instate or out of state, plans to sell base load electricity to a California utility that utility will have to demonstrate that the project meets the EPS. *Base load* units are defined as units that operate at a capacity factor higher than 60 percent. As a renewable electricity generating facility, GSEP is determined by rule to be compliant with the SB 1368 EPS.

In addition to these programs, California is involved in the Western Climate Initiative, a multi-state and international effort to establish a cap and trade market to reduce greenhouse gas emissions in the Western United States and the Western Electricity Coordinating Council (WECC). The timelines for the implementation of this program are similar to those of AB 32, with full roll-out beginning in 2012. And as with AB 32, the electricity sector has been a major focus of attention.

ELECTRICITY PROJECT GREENHOUSE GAS EMISSIONS

Electricity use can be as simple as turning on a switch to operate a light or fan. The system to deliver adequate and reliable electricity supply is complex and variable. But it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation generally curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services[15] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

[12] Public Utilities Code § 8340 et seq.

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

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

[15] See page CEC 2009b, page 95.

California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix. The generation of electricity using fossil fuels, even in a back-up generator at a thermal solar plant, produces air emissions known as greenhouse gases in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. Greenhouse gas emissions contribute to the warming of the earth's atmosphere, leading to climate change.

PROJECT CONSTRUCTION

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. The construction would last approximately 37 months. The greenhouse gas emissions estimate, for the entire construction period, provided by the applicant[16] is below in **Greenhouse Gas Table 2**.

Greenhouse Gas Table 2
Estimated GSEP Potential Construction Greenhouse Gas Emissions

	CO_2-Equivalent (MTCO2E) [a,b]
Onsite Equipment	24,094
Gas Pipeline Equipment	1,544
Access Road Equipment	564
Transmission Line Equipment	1,185
Delivery Vehicles	3,520
Construction Worker Vehicles	22,067
Entire Construction Period Total	**52,974**

Source: TTEC 2010h, Table 2 and Table K.5-5.
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms
[b] The vast majority of the CO2E emissions, over 99 percent, is CO_2 from construction combustion sources.

PROJECT OPERATIONS

Operations GHG emissions, for both units, are shown in **Greenhouse Gas Table 3**. Operation of the GSEP would cause GHG emissions from the auxiliary boilers, fire water pump engines, emergency generator engines, maintenance fleet and employee trips, and sulfur hexafluoride emissions from new electrical component equipment.

[16] As noted in the Air Quality Section staff may be re-estimating certain construction emissions which would revise some of the values in **Greenhouse Gas Table 2**. If so, staff will provide a revised construction GHG emission estimate as part of a Staff Assessment Addendum.

Greenhouse Gas Table 3
Estimated GSEP Potential Operating Greenhouse Gas Emissions

	Annual CO_2-Equivalent (MTCO2E)[a]
Auxiliary Boilers [b]	3,520
Emergency Generators [b]	83.9
Fire Pumps [b]	17.5
Maintenance Vehicles [b]	194.1
Delivery Vehicles [b]	42
Employee Vehicles [b]	272.3
Equipment Leakage (SF_6)	3.4
Total Project GHG Emissions – MTCO2E [b]	**4,133**
Facility MWh per year	600,000
Facility GHG Emission Rate (MTCO2E/MWh)	0.007

Sources: GSEP 2009f, DR 34; TTEC 2010h, p. 22 to 25.
[a] One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] The vast majority of the CO2E emissions, over 99 percent, is CO_2 from these emission sources.

Greenhouse Gas Table 3 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. All emissions are converted to CO_2-equivalent and totaled. Electricity generation GHG emissions are generally dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled. For this solar project the primary fuel, solar energy, is greenhouse gas free, but there is natural gas used in the two auxiliary boilers used for morning startup and HTF freeze protection, and gasoline and diesel fuel use in the maintenance vehicles, offsite delivery vehicles, staff and employee vehicles, the two emergency fire water pump engines, and two emergency generator engines. Another GHG emission source for this proposed project is SF_6 from electrical equipment leakage.

The proposed project is estimated to emit, directly from primary and secondary emission sources on an annual basis, over 4,000 metric tonnes of CO_2-equivalent GHG emissions per year. GSEP, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]). Regardless, GSEP has an estimated GHG emission rate of 0.007 MTCO2E/MWh, well below the Greenhouse Gas Emission Performance Standard of 0.500 MTCO2/MWh.

Solar Project Energy Payback Time

The beneficial energy and greenhouse gas impacts of renewable energy projects can also be measured by the *energy payback time*[17]. **Greenhouse Gas Tables 2** and **3** provide an estimate of the onsite construction and operation emissions, employee transportation emissions, and the final segment of offsite materials and consumables transportation. However, there are additional direct transportation and indirect manufacturing GHG emissions associated with the construction and operation of the

[17] The energy payback time is the time required to produce an amount of energy as great as what was consumed during production, which in the context of a solar power plant includes all of the energy required during construction and operation.

proposed project, which are all considered in the determination of the energy payback time. A document sponsored by Greenpeace estimates that the energy payback time for concentrating solar power plants, such as GSEP, to be on the order of 5 months (Greenpeace 2005, Page 9); and the project life for GSEP is on the order of 30 years. Therefore, the proposed project's GHG emissions reduction potential from energy displacement would be substantial[18].

Natural Carbon Uptake Reduction

This proposed project would cause the clearing of land and removal of vegetation, which would reduce the ongoing natural carbon uptake by vegetation. A study of the Mojave Desert indicated that the desert may uptake carbon in amounts as high as 100 grams per square meter per year (Wohlfahrt et. al. 2008). This would equate to a maximum reduction in carbon uptake, calculated as CO_2, of 1.48 MT of CO_2 per acre per year for areas with complete vegetation removal. For this 1,887 acre proposed project, which does require the complete removal of vegetation over most of the project site, the maximum equivalent loss in carbon uptake would be 2,793 MT of CO_2 per year, which would correspond to 0.005 MT of CO_2 per MW generated. Therefore, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO_2 emissions, which can range from 0.35 to 1.0 MT of CO_2 per MW depending on the fuel and technology, that is enabled by this proposed project.

CLOSURE AND DECOMMISSIONING

Closure and decommissioning, as a one-time limited duration event, would have emissions that are similar in type and magnitude, but likely lower than, the construction emissions as discussed above.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses four kinds of impacts: construction, operation, closure and decommissioning, and cumulative effects. As the name implies, construction impacts result from the emissions occurring during the construction of the proposed project. The operation impacts result from the emissions of the proposed project during operation. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time. The impact of GHG emissions caused by this solar facility is characterized by considering how the power plant would affect the overall electricity system. The integrated electricity system depends on non-fossil and fossil-fueled generation resources to provide energy and satisfy local capacity needs. As directed by the Energy Commission's adopted order initiating an informational (OII) proceeding (08-GHG OII-1) (CEC 2009a), staff is refining and implementing the concept of a "blueprint" that describes the long-term roles (i.e., retirements and displacement) of

[18] The GHG displacement for the project would be similar to, but not exactly the same as, the amount of energy produced after energy payback is achieved multiplied by the average GHG emissions per unit of energy displaced. The average GHG emissions for the displaced energy over the project life is not known but currently fossil fuel fired power plants have GHG emissions that range from 0.35 MT/MWh CO2E for the most efficient combined cycle gas turbine power plants to over 1.0 MT/MWh for coal fired power plants.

fossil-fueled power plants in California's electricity system as we move to a high-renewable, low-GHG electricity system, which will include projects like GSEP.

PROPOSED PROJECT

Construction Impacts

Staff concludes that the GHG emission increases from construction activities would not be CEQA significant for several reasons. First, the period of construction would be short-term and the emissions intermittent during that period, not ongoing during the life of the proposed project. Second, best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. And lastly, these temporary GHG emissions are necessary to create this renewable energy source that would provide power with a very low GHG emissions profile, and the construction emissions would be more than offset by the reduction in fossil fuel fired generation that would be enabled by this proposed project. If the project construction emissions were distributed over the estimated 30 year life of the proposed project they would only increase the project life time annual facility GHG emissions rate by 0.0029 MT CO2E per MWh.

Direct/Indirect Operation Impacts and Mitigation

The proposed Genesis Solar Energy Project promotes the state's efforts to move towards a high-renewable, low-GHG electricity system, and, therefore, reduces both the amount of natural gas used by electricity generation and greenhouse gas emissions.

Net GHG emissions for the integrated electric system will decline when new renewable power plants are added to: 1) move renewable generation towards the 33 percent target; 2) improve the overall efficiency, or GHG emission rate, of the electric system; or 3) serve load growth or capacity needs more efficiently, or with fewer GHG emissions.

The Role of GSEP in Renewables Goals/Load Growth

As California moves towards an increased reliance on renewable energy by implementing the Renewables Portfolio Standard (RPS), non-renewable energy resources will be displaced. These reductions in non-renewable energy, shown in **Greenhouse Gas Table 4**, are targeted to be as much as 36,500 GWh. These assumptions are conservative in that the forecasted growth in electricity retail sales assumes that the impacts of planned increases in expenditures on (uncommitted) energy efficiency are already embodied in the current retail sales forecast[19]. Energy Commission staff estimates that as much as 18,000 GWh of additional savings due to

[19] Energy efficiency savings are already represented in the current Energy Commission demand forecast adopted December 2009 (CEC 2009c).

uncommitted energy efficiency programs may be forthcoming.[20] This would reduce non-renewable energy needs by a further 12,000 GWh given a 33 percent RPS.

Greenhouse Gas Table 4
Estimated Changes in Non-Renewable Energy Potentially Needed to Meet California Loads, 2008-2020

California Electricity Supply	**Annual GWh**	
Statewide Retail Sales, 2008, actual [a]	264,794	
Statewide Retail Sales, 2020, forecast [a]	289,697	
Growth in Retail Sales, 2008-20	24,903	
Growth in Net Energy for Load [b]	29,840	
California Renewable Electricity	**GWh @ 20% RPS**	**GWh @ 33% RPS**
Renewable Energy Requirements, 2020 [c]	57,939	95,600
Current Renewable Energy, 2008	29,174	
Change in Renewable Energy-2008 to 2020	28,765	66,426
Resulting Change in Non-Renewable Energy	176	(36,586)

Source: Energy Commission staff 2010.
Notes:
a. 2009 IPER Demand Forecast, Form 1.1c. Excludes pumping loads for entities that do not have an RPS.
b. 2009 IEPR Demand Forecast, Form 1.5a.
c. RPS requirements are a percentage of retail sales.

The Role of GSEP in Retirements/Replacements

Genesis Solar Energy Project would be capable of annually providing 600 GWh of renewable generation energy to replace resources that are or will likely be precluded from serving California loads. State policies, including GHG goals, are discouraging or prohibiting new contracts and new investments in high GHG-emitting facilities such as coal-fired generation, generation that relies on water for once-through cooling, and aging power plants (CEC 2007). Some of the existing plants that are likely to require substantial capital investments to continue operation in light of these policies may be unlikely to undertake the investments and will retire or be replaced.

Replacement of High GHG-Emitting Generation

High GHG -emitting resources, such as coal, are effectively prohibited from entering into new long-term contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under these contracts will have to reduce GHG emissions or be replaced; these contracts are presented in **Greenhouse Gas Table 5**.

[20] See *Incremental Impacts of Energy Efficiency Policy Initiatives Relative to the 2009 Integrated Energy Policy Report Adopted Demand Forecast* (CEC-200-2010-001-D, January, 2010), page 2. Table 1 indicates that additional conservation for the three investor-owned utilities may be as high as 14,374 GWh. Increasing this value by 25 percent to account for the state's publicly-owned utilities yields a total reduction of 17,967 GWh.

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

Utility	Facility [a]	Contract Expiration	Annual GWh Delivered to CA
PG&E, SCE	Misc In-state Qual. Facilities [a]	2009-2019	4,086
LADWP	Intermountain	2009-2013	3,163 [b]
City of Riverside	Bonanza, Hunter	2010	385
Department of Water Resources	Reid Gardner	2013 [c]	1,211
SDG&E	Boardman	2013	555
SCE	Four Corners	2016	4,920
Turlock Irrigation District	Boardman	2018	370
LADWP	Navajo	2019	3,832
		TOTAL	18,522

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
Notes:
a. All facilities are located out-of-state except for the Miscellaneous In-state Qualifying Facilities.
b. Estimated annual reduction in energy provided to LADWP by Utah utilities from their entitlement by 2013.
c. Contract not subject to Emission Performance Standard, but the Department of Water Resources has stated its intention not to renew or extend.

This represents almost half of the energy associated with California utility contracts with coal-fired resources that will expire by 2030. If the State enacts a carbon adder[21], all the coal contracts (including those in **Greenhouse Gas Table 5**, which expire by 2020 and, other contracts that expire beyond 2020 and are not shown in the table) may be retired at an accelerated rate as coal-fired energy becomes uncompetitive due to the carbon adder or the capital needed to capture and sequester the carbon emissions. Also shown are the approximate 500 MW of in-state coal and petroleum coke-fired capacity that may be unlikely to contract with California utilities for baseload energy due to the SB1368 Emission Performance Standard. As these contracts expire, new and existing generation resources will replace the lost energy and capacity. Some will come from renewable generation such as this proposed project; some will come from new and existing natural gas fired generation. All of these new facilities will have substantially lower GHG emissions rates than coal and petroleum coke-fired facilities which typically averages about 1.0 $MTCO_2$/MWh without carbon capture and sequestration. Thus, new renewable facilities will result in a net reduction in GHG emissions from the California electricity sector.

Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board (SWRCB) has proposed major changes to once-through cooling (OTC) units, shown in **Greenhouse Gas Table 6**, which would likely require extensive capital to retrofit, or retirement, or substantial curtailment of dozens of generating units. In 2008, these units collectively produced almost 58,000 GWh. While the more recently built OTC facilities may well install dry or wet cooling towers and continue to operate, the aging OTC plants are not likely to be retrofit to use

[21] A carbon adder or carbon tax is a specific value added to the cost of a project for per ton of associated carbon or carbon dioxide emissions. Because it is based on, but not limited to, actual operations and emission and can be trued up at year end, it is considered a simple mechanism to assign environmental costs to a project.

dry or wet cooling towers without the power generation also being retrofit or replaced to use a more efficient and lower GHG emitting combined cycle gas turbine technology. Most of these existing OTC units operate at low capacity factors, suggesting a limited ability to compete in the current electricity market. Although the timing would be uncertain, new resources would out-compete aging plants and would displace the energy provided by OTC facilities and likely accelerate their retirements.

Any additional costs associated with complying with the SWRCB regulation would be amortized over a limited revenue stream today and into the foreseeable future. Their energy and much of their dispatchable, load-following capability will have to be replaced. These units constitute over 15,000 MW of merchant capacity and 17,800 GWh of merchant energy. Of this, much but not all of the capacity and energy are in local reliability areas, requiring a large share of replacement capacity – absent transmission upgrades – to locations in the same local reliability area. **Greenhouse Gas Table 6** provides a summary of the utility and merchant energy supplies affected by the OTC regulations.

New renewable generation resources will emit substantially less GHG emissions on average than other energy generation sources. Existing aging and OTC natural gas facility generation typically averages 0.6 to 0.7 $MTCO_2$/MWh, which is much less efficient, higher GHG emitting, than a renewable energy project like GSEP. A project like GSEP, located far from the coastal load pockets like the Los Angeles Local Reliability Area (LRA), would more likely provide energy support to facilitate the retirement of some aging and/or OTC power plants, but would not likely provide any local capacity support at or near the coastal OTC units. Regardless, due to its low greenhouse gas emissions, GSEP would serve to reduce GHG emissions from the electricity sector.

Closure and Decommissioning

Eventually the facility would close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those greenhouse gas emissions would no longer occur. The only other expected, albeit temporary, GHG emissions would be equipment exhaust (off-road and on-road) from dismantling activities. These activities would be of much a shorter duration than construction of the proposed project, equipment used to dismantle the facility are assumed to have lower comparative GHG emissions due to technology advancement, and would be required to be controlled in a manner at least equivalent to that required during construction. It is assumed that the beneficial GHG impacts of this facility, displacement of fossil fuel fired generation, would be replaced by the construction of newer more efficiency renewable energy or other low GHG generating technology facilities. Also, the recycling of the facility components (steel, concrete, etc.) could indirectly reduce GHG emissions from decommissioning activities. Therefore, while there would be temporary adverse greenhouse gas CEQA impacts during decommissioning they are determined to be less than significant.

Greenhouse Gas Table 6
Aging and Once-Through Cooling Units: 2008 Capacity and Energy Output [a]

Plant, Unit Name	Owner	Local Reliability Area	Aging Plant?	Capacity (MW)	2008 Energy Output (GWh)	GHG Emission Rate ($MTCO_2$/MWh)
Diablo Canyon 1, 2	Utility	None	No	2,232	17,091	Nuclear
San Onofre 2, 3	Utility	L.A. Basin	No	2,246	15,392	Nuclear
Broadway 3 [b]	Utility	L.A. Basin	Yes	75	90	0.648
El Centro 3, 4 [b]	Utility	None	Yes	132	238	0.814
Grayson 3-5 [b]	Utility	LADWP	Yes	108	150	0.799
Grayson CC [b]	Utility	LADWP	Yes	130	27	0.896
Harbor CC	Utility	LADWP	No	227	203	0.509
Haynes 1, 2, 5, 6	Utility	LADWP	Yes	1,046	1,529	0.578
Haynes CC	Utility	LADWP	No	560	3,423	0.376
Humboldt Bay 1, 2 [a]	Utility	Humboldt	Yes	107	507	0.683
Olive 1, 2 [b]	Utility	LADWP	Yes	110	11	1.008
Scattergood 1-3	Utility	LADWP	Yes	803	1,327	0.618
Utility-Owned				7,776	39,988	0.693
Alamitos 1-6	Merchant	L.A. Basin	Yes	1,970	2,533	0.661
Contra Costa 6, 7	Merchant	S.F. Bay	Yes	680	160	0.615
Coolwater 1-4 [b]	Merchant	None	Yes	727	576	0.633
El Segundo 3, 4	Merchant	L.A. Basin	Yes	670	508	0.576
Encina 1-5	Merchant	San Diego	Yes	951	997	0.674
Etiwanda 3, 4 [b]	Merchant	L.A. Basin	Yes	666	848	0.631
Huntington Beach 1, 2	Merchant	L.A. Basin	Yes	430	916	0.591
Huntington Beach 3, 4	Merchant	L.A. Basin	No	450	620	0.563
Mandalay 1, 2	Merchant	Ventura	Yes	436	597	0.528
Morro Bay 3, 4	Merchant	None	Yes	600	83	0.524
Moss Landing 6, 7	Merchant	None	Yes	1,404	1,375	0.661
Moss Landing 1, 2	Merchant	None	No	1,080	5,791	0.378
Ormond Beach 1, 2	Merchant	Ventura	Yes	1,612	783	0.573
Pittsburg 5-7	Merchant	S.F. Bay	Yes	1,332	180	0.673
Potrero 3	Merchant	S.F. Bay	Yes	207	530	0.587
Redondo Beach 5-8	Merchant	L.A. Basin	Yes	1,343	317	0.810
South Bay 1-4	Merchant	San Diego	Yes	696	1,015	0.611
Merchant-Owned				15,254	17,828	0.605
Total In-State OTC				23,030	57,817	

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.

a. OTC Humboldt Bay Units 1 and 2 are included in this list. They must retire in 2010 when the new Humboldt Bay Generating Station (not ocean-cooled), currently under construction, enters commercial operation.

b. Units are aging but are not OTC.

REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, and would be a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by removing the eastern solar field, it would reduce the water required for cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

The Reduced Acreage Alternative would reduce the total construction and operation GHG emissions of the proposed project (see **Greenhouse Gas Tables 2** and **3**) by somewhat less than 50 percent, due to lower efficiencies of the somewhat smaller project size.

The results of the Reduced Acreage Alternative would be the following:

- The impacts of the proposed project would not occur on the lands not used due to the smaller project size. 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.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would be reduced. Both State and Federal law support the increased use of renewable power generation.

If the Reduced Acreage Alternative were approved, other renewable projects may be developed that would compensate for the loss of generation compared to the proposed project on other sites in the Riverside County, the Colorado Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates.

DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

The Dry Cooling Alternative would minimally impact the direct construction and operation GHG emissions of the proposed project. The construction of the ACC versus the construction of the cooling tower could very slightly increase construction GHG emissions from that of the proposed project shown in **Greenhouse Gas Table 2**. The use of the ACC could require an increase in auxiliary boiler use during daily plant startup increasing the direct GHG emissions from that of the proposed project shown in **Greenhouse Gas Table 3**, and the reduction in steam cycle efficiency would reduce total project generation by a minor amount . This would increase the direct project GHG emissions per net MWh of generation, as shown in **Greenhouse Gas Table 3**, by the same amount and reduce the indirect GHG emission reductions caused by the project

by the same amount. However, this is not that substantial an increase compared to the GHG emissions from the fossil fuel-fired power plant generation that the project would displace and would not change the overall GHG emission findings.

The results of the Dry Cooling Alternative would be the following:

- Direct GHG emissions similar to or slightly higher than the proposed project would occur.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would be slightly reduced due to a reduction in steam cycle efficiency. Both State and Federal law support the increased use of renewable power generation.

NO ACTION ALTERNATIVES

No Action On Proposed Project Application And On CDCA Land Use Plan Amendment

Under this alternative, the proposed project would not be approved by the CEC 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 this 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 Riverside County, the Colorado 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 several pending solar and wind projects near the project area along the I-10 corridor including two thermal solar projects, the Palen Solar Power Project and Blythe Solar Power Project siting cases, which are currently being evaluated by the Energy Commission and BLM. Additionally, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

No Action On Proposed Project And Amend The CDCA Land Use Plan To Make The Area Available For Future Solar Development

Under this alternative, the proposed project would not be approved by the CEC 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 a result, GHG emissions would result from the construction and operation of the solar technology and would likely be similar to the GHG emissions from the proposed project. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would provide the more significant benefit, like the proposed project, of displacing fossil fuel fired generation and reducing associated GHG emissions. As such, this No Project/No Action Alternative could result in GHG benefits similar to those of the proposed project.

No Action On Proposed Project Application And Amend The CDCA Land Use Plan To Make The Area Unavailable For Future Solar Development

Under this alternative, the proposed project would not be approved by the CEC 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, the greenhouse gas emissions from the site, including carbon uptake, is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in the GHG benefits from 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.

CUMULATIVE IMPACTS

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

This entire assessment is a cumulative impact assessment. The proposed project alone would not be sufficient to change global climate, but would emit greenhouse gases and therefore has been analyzed as a potential cumulative impact in the context of existing GHG regulatory requirements and GHG energy policies.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The Genesis Solar Energy Project, as a solar energy generation project, is exempt from the mandatory GHG emission reporting requirements for electricity generating facilities as currently required by the California Air Resources Board (ARB) for compliance with the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Statutes of 2006, Chapter 488, Health and Safety Code sections 38500 et seq.) (ARB 2008a).

The GSEP, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

Since the proposed project would have emissions that are below 25,000 MT/year of CO2E, the proposed project would not be subject to federal mandatory reporting of greenhouse gases. It would also be exempt from the state's greenhouse gas reporting requirements.

NOTEWORTHY PUBLIC BENEFITS

Greenhouse gas related noteworthy public benefits include the construction of renewable and low-GHG emitting generation technologies and the potential for successful integration into the California and greater WECC electricity systems. Additionally, the GSEP project would contribute to meeting the state's AB 32 goals.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

There have been no agency or public comments received on staff's greenhouse gas section.

CONCLUSIONS

The Genesis Solar Energy Project would emit considerably less greenhouse gases (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average. The proposed project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff concludes that the proposed project's operation would result in a cumulative overall reduction in GHG emissions from the state's power plants that would create beneficial impacts, would not worsen current conditions, and would thus not result in CEQA impacts that are cumulatively significant or result in adverse impacts under NEPA.

Staff concludes that the GHG emission increases typical from construction and decommissioning activities would not be CEQA significant for several reasons. First, the periods of construction and decommissioning would be short-term and not ongoing

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

The GSEP, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903 [b][1]).

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No Conditions of Certification related to project greenhouse gas emissions are proposed because the proposed project would create beneficial GHG impacts. The project owner would have to comply with any future applicable GHG regulations formulated by the ARB or the U.S.EPA, such as GHG reporting or emissions cap and trade markets.

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ACRONYMS

ARB	California Air Resources Board
CalEPA	California Environmental Protection Agency
CEE	California Energy Commissions
CEQA	California Environmental Quality Act
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO2E	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EPS	Emission Performance Standard
GCC	Global Climate Change
GHG	Green House Gas
GSEP	Genesis Solar Energy Project
GWh	Gigawatt-hour
HFC	Hydrofluorocarbons
IEPR	Integrated Energy Policy Report
IGCC	Integrated Gasification Combined Cycle
LADWP	Los Angeles Department of Water and Power
LRAs	Local Reliability Areas
MT	Metric tonnes
MW	Megawatts
MWh	Megawatts-hour
N_2O	Nitrous Oxide
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_3	Nitrates
NOx	Oxides of Nitrogen or Nitrogen Oxides
OII	Order Initiating an Informational
OTC	Once-Through Cooling
PFC	Perfluorocarbons
PSD	Prevention of Significant Deterioration
QFER	Quarterly Fuel and Energy Report
RPS	Renewables Portfolio Standard
SB	Senate Bill
SCE	Southern California Edison

SF_6	Sulfur hexafluoride
SWRCB	State Water Resource Control Board
WECC	Western Electricity Coordinating Council

C.2 - BIOLOGICAL RESOURCES

Testimony of Heather Blair, Carolyn Chainey-Davis, Amy Golden, Sara Keeler, Mark Massar and Susan Sanders

C.2.1 SUMMARY OF CONCLUSIONS

Overview of Impacts to Biological Resources

The Genesis Solar Energy Project (Genesis Project or Project) would have significant impacts to biological resources, eliminating all of the Sonoran creosote bush scrub and other native plant and wildlife communities within the approximately 1,880-acre site, including 91 acres of desert washes. Without mitigation the Genesis Project would contribute to the cumulatively significant loss of biological resources within the Chuckwalla Valley and the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) area. Staff recommends avoidance and minimization measures as well as compensatory mitigation to offset direct, indirect, and cumulative impacts to desert tortoise and other special-status species, and to assure compliance with state and federal laws such as the federal and state endangered species acts and regulations protecting waters of the state. With implementation of staff's proposed conditions of certification, Project impacts to biological resources would be reduced to less than significant levels.

Mitigation for Desert Tortoise

The measures in staff's proposed Conditions of Certification **BIO-9** through **BIO-11** would avoid and minimize potential take of desert tortoise during Project construction and operation. To offset the loss of desert tortoise habitat, staff's proposed Condition of Certification **BIO-12** recommends habitat compensation at a 1:1 ratio for desert tortoise 1,749 acres (i.e., acquisition and preservation of one acre of compensation lands for every acre lost). For Project impacts to 23 acres within the Chuckwalla Desert Tortoise Critical Habitat Unit, the mitigation ratio would be 5:1. This compensatory mitigation is consistent with recommendations from the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), and BLM guidance in the NECO. Staff's proposed Condition of Certification **BIO-12** also requires that the land acquisitions be within the Colorado Desert Recovery Unit, and have potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise populations and designated critical habitat. These conditions satisfy the California Department of Fish and Game's requirements under Section 2081 of the California Fish and Game Code. To address Project-related increases in ravens, a desert tortoise predator, staff's proposed Condition of Certification **BIO-13** requires implementation of a Raven Monitoring, Management and Control Plan, as well as contributions to the USFWS Regional Raven Management Program.

Impacts to Mojave Fringe-toed Lizards

The Genesis Project would directly impact 38 acres of Mojave fringe-toed lizard habitat (including 1 acre of dunes and 37 acres of playa with sand drifts) and indirectly affect 151 acres of habitat downwind of the Project Disturbance Area. The indirect impact results from the Project solar arrays extending into the sand transport corridor,

diminishing the input of sand to downwind areas and reducing the active sand layer that is crucial to Mojave fringe-toed lizard habitat. The Mojave fringe-toed lizards in the Chuckwalla Valley are at the southernmost portion of the species range, and the proposed Project could increase the risks of local extirpation of an already fragmented and isolated population. Staff's proposed Condition of Certification **BIO-20** recommends acquisition and protection of habitat supporting core populations of Mojave fringe-toed lizard habitat in the Chuckwalla Valley, which would reduce Project impacts to less than significant levels.

Ephemeral Drainages

The Project would directly impact 91 acres of state jurisdictional waters, including 16 acres of microphyllous riparian vegetation, eliminating the hydrological, biogeochemical, vegetation, and wildlife functions of this network of ephemeral drainages. As many as 21 acres of ephemeral drainages downstream of the Project area could also be indirectly impacted by changes in upstream hydrology. Staff considers the direct, indirect, and cumulative impacts to ephemeral drainages to be significant. The measures in staff's proposed Condition of Certification **BIO-22** would minimize and offset direct and indirect impacts to state waters to less than significant levels and would assure compliance with CDFG codes that provide protection to these state waters. These measures include acquisition and enhancement of 132 acres of ephemeral dry washes within the Chuckwalla-Ford Dry Lake watershed, as well as avoidance and minimization measures to protect drainages near the Project site.

Special-Status Plants

No federal or state-listed plant species occur within the Project Disturbance Area but four species of special-status plants were detected within the Study area during spring 2009 and 2010 surveys, including Harwood's milk-vetch, desert unicorn, and ribbed cryptantha. Harwood's eriastrum, a California endemic and BLM Sensitive species, was detected at the Colorado River Substation site and Project linears east of the site during the 2010 spring surveys by Solar Millennium (AECOM 2010d). Harwood's eriastrum has a global distribution restricted to the southeast corner of California, and it is known from only 14 documented locations, several of which are historic records that have not been verified. Staff concludes that the Project's direct, indirect, and cumulative impacts to Harwood's eriastrum and Harwood's milk-vetch are significant, but impacts to ribbed cryptantha are not. While the direct effects of the Project on desert unicorn are minor, the impacts of all future projects in the NECO planning area are cumulatively considerable. The avoidance, minimization and compensation measures described in Condition of Certification **BIO-19** (Special-Status Plant Mitigation) would minimize the impacts to Harwood's eriastrum and Harwood's milk-vetch to a level less than significant, and would reduce the Project's contribution to cumulative effects to special-status plants to a level less than considerable.

Abram's spurge, flat-seeded spurge, lobed ground cherry,have moderate to high potential to occur within the Project site. They were not detected during spring 2009 and 2010 botanical surveys but may have been missed because they are late season plants that cannot be detected during routine spring surveys. Project construction and operation could result in direct and indirect impacts to late season special-status plants, if present, and impacts to these and other species may be significant. **BIO-19** includes a

requirement to conduct late-season surveys in summer-fall 2010. Specific triggers and detailed performance standards for mitigation of impacts are included in **BIO-19** to ensure that impacts to any special-status plants found during the late season surveys are mitigated to a level less than significant.

Impacts to Groundwater Dependent Vegetation Communities

The proposed Project's groundwater pumping would have an impact on groundwater levels within the zone of potential effect centered on the Project's pumping well. Considerable uncertainty remains as to the potential extent of the Project's impacts to groundwater and the potential adverse effects to groundwater dependent sensitive plant communities and to wildlife. To ensure that the Project's proposed use of groundwater does not lower groundwater levels in the basin so that biological resources are significantly and adversely affected, staff has proposed that the Applicant develop a vegetation monitoring program and identify what changes are occurring in basin water levels and in groundwater-dependent vegetation. Substantial changes in the vigor of groundwater-dependent vegetation would be monitored and documented under the Vegetation Monitoring and Reporting Plan outlined in staff's proposed Condition of Certification **BIO-25**. Condition of Certification **BIO-26** specifies remedial action to be taken if adverse effects are detected. These measures would be sufficient to ensure that the groundwater pumping for the Project would not result in significant adverse impacts to groundwater-dependent ecosystems in the Chuckwalla Basin.

Migratory Birds/Burrowing Mammals

Sonoran creosote bush scrub and ephemeral drainages within the Project Area provide foraging, cover, and/or breeding habitat for migratory birds, including a number of special-status bird species potentially occurring at the site (including loggerhead shrike, western burrowing owl, and California horned lark). Implementation of staff's proposed Conditions of Certification **BIO-8** (Impact Avoidance and Best Management Practices), **BIO-15** (Pre-Construction Nest Surveys), and **BIO-16** (Avian Protection Plan) would avoid these potentially significant impacts to nesting birds. Potential impacts to burrowing owls would be further mitigated by implementation of staff's proposed Condition of Certification **BIO-18**. This condition involves impact avoidance and minimization measures and passive relocation of burrowing owls

American badgers and desert kit foxes occur throughout the Project area, and construction activities could crush or entomb these burrowing species. Staff's proposed Condition of Certification **BIO-17**, which requires preconstruction surveys and avoidance measures to protect badgers and kit foxes, would avoid these potential impacts.

Impacts and Mitigation for Golden Eagles

Surveys were conducted in spring 2010 for golden eagle territories within 10 miles of the Project boundaries, but survey results were not available at the time of publication of the Revised Staff Assessment. In the absence of survey information, staff analyzed the potential impacts to nesting golden eagles using the conservative assumption that nests might occur close enough to Project boundaries to be disturbed by construction activities. Staff's proposed Condition of Certification **BIO-28,** implementation of a golden eagle monitoring and management program, would mitigate potential impacts to golden

eagles from construction to less than significant levels. Staff also concluded that the Project would contribute to the cumulative loss of golden eagle foraging habitat, but staff's proposed Condition of Certification **BIO-12** would compensate for the Project's contribution to the cumulative loss of golden eagle foraging habitat.

Alternatives

Staff analyzed two alternatives to the Proposed Project other than the No Project Alternative, the Reduced Acreage Alternative and the Dry Cooling Alternative. Staff considers direct, indirect, and cumulative impacts from the Proposed Project and both alternatives to be similar (aside from differences in impact acreage) for most biological resources, including impacts to desert tortoise habitat, Couch's spadefoot toad, microphyll woodland, and migratory birds. While impacts from the Reduced Acreage Alternative are substantially less to Mojave fringe-toed lizard habitat and desert washes, these impacts would still be considered significant under this alternative as well as under the Proposed Project and Dry Cooling Alternative.

Cumulative Effects

Construction and operation of the Genesis Project will have effects on a number of biological resources that are individually limited but cumulatively considerable. In conducting the cumulative effects analysis, staff employed a quantitative, GIS-based analysis of direct impacts to habitat, and a qualitative analysis of indirect effects. Geographic scope varied between biological resources, but most analyses were based on the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) boundaries. Staff identified significant cumulative effects to: desert washes in the Chuckwalla-Ford Dry Lake watershed and the broader NECO planning area; desert tortoise habitat; golden eagle foraging habitat; Mojave fringe toed lizard and their habitat; habitat for American badger, desert kit fox, and burrowing owl; Le Conte's thrasher habitat; Couch's spadefoot toad range; habitat for Harwood's milk-vetch and other dune/playa-dependent special-status plants; wildlife habitat and connectivity within the Palen-Ford WHMA (for Mojave fringe toed lizard, dunes, and playa); Mojave and Sonoran creosote bush scrub; desert dry wash woodland; playa and sand drifts over playa, and dunes. Implementation of staff's proposed conditions of certification would reduce the Project's contribution to cumulative effects to a level that is not cumulatively considerable.

C.2.2 INTRODUCTION

This section of the Revised Staff Assessment (RSA) provides the California Energy Commission staff analysis of potential impacts to biological resources from the construction and operation of the Genesis Project. This analysis describes the biological resources at the proposed Project site and addresses potential impacts to special-status species, sensitive natural communities, and other significant biological resources. This section discusses the need for mitigation, evaluates the adequacy of mitigation proposed by the Applicant, and specifies additional mitigation measures designed to reduce impacts. It also describes compliance with applicable laws, ordinances, regulations, and standards (LORS) and recommends staff's proposed conditions of certification.

This analysis is based, in part, upon information from the following sources: the Application for Certification (AFC) (GSEP 2009a); Data Adequacy Supplement (GSEP 2009c) and Data Adequacy Supplement 1A (GSEP 2009d); responses to staff data requests (GSEP 2009f, TTEC 2010f); staff workshops held on November 23 and 24, December 18 and 31, 2009 and January 6, 11, and 12, February 10 and 18, 2010, April 19, 20, and 21 and May 5, 2010; site visits by staff on October 27, 2009, December 10, 2009, January 12 and February 25, 2010; the Applicant's December 2009 Notification of a Lake or Streambed Alteration (TTEC 2009d) revisions to the Notification of a Lake or Streambed Alteration (TTEC 2010j, TTEC 2010l); the applicant's *Aeolian Transport Evaluation and Ancient Shoreline Delineation Report for the GSEP* (Worley Parsons 2010c); the applicant's *Interim Preliminary Aeolian Sand Source, Migration and Deposition Letter Report for GSEP* (Worley Parsons 2010d); PWA's Geomorphic Assessment of the Genesis Solar Project Site (**Soil and Water Appendix A;** PWA 2010a); the Applicant's *Incidental Take of Threatened and Endangered Species Permit Application* (TTEC 2009c); the Applicant's draft mitigation plans including the Draft Desert Tortoise Relocation/Translocation Plan (TTEC 2010a), Draft Weed Management Plan (TTEC 2010g), Draft Revegetation Plan (TTEC 2010i), and Draft Common Raven Monitoring, Control and Management Plan (TTEC 2010k); preliminary 2010 survey data (TTEC 2010m) and other supplemental information (TTEC 2010r, TTEC 2010p); information about minor changes to the Project (TTEC 2010o); communications with representatives from the California Department of Fish and Game (CDFG), Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS); and information contained within the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO).

Changes from Staff Assessment/Draft Environmental Impact Statement:

While much of this section of the Revised Staff Assessment (RSA) is identical to that published in the March 2010 Staff Assessment/Draft Environmental Impact Statement (SA/DEIS), some revisions have been made that reflect changed circumstances and new information, as summarized below:

- Separate CEQA/NEPA Documents. The SA/DEIS was a joint California Environmental Quality Act (CEQA) /National Environmental Policy Act (NEPA) document, but now the BLM's NEPA analysis, the Final Environmental Impact Statement, will be published separately from the RSA. The NEPA-specific language from the SA/DEIS has generally been retained in this section. The **Introduction** section of the RSA provides a detailed discussion of the separation of the CEQA and NEPA documents.
- 2010 Survey Results: The RSA incorporates preliminary spring 2010 survey results (TTEC 2010m) from special-status plant and wildlife species survey results that were performed within the Project's gen-tie transmission line. The 2010 spring surveys followed a wet winter and spring and as a result additional species and new locations of rare plants were detected that had been missed in 2009.
- New Project Features and Modifications: Minor Project changes have been made since the Genesis Solar Energy Project SA/DEIS was published (TTEC 2010o). Staff

- has analyzed the impacts of these Project modifications in subsection C.2.4.2. The modifications include:
  - A proposed six pole extension of the Genesis transmission line at the tie-in with the Colorado River Substation;
  - A power and telecommunications line to provide power and communication during construction at the plant site; and
  - The removal of the "toe" area, a 41.4-acre area at the easternmost portion of the solar fields, to avoid impacts to sand dune habitat and a sand transport corridor.
- Additional Mitigation Options: Discussion of mitigation options has been added to reflect recent establishment of a Renewable Energy Action Team –National Fish and Wildlife Foundation Account that may be used by the Applicant to deposit mitigation funding, as well as SBX8 34, legislation recently signed by the Governor that allows qualifying projects like the Genesis Project to make use of a new in-lieu fee program.
- New and Revised Conditions of Certification: The RSA includes two new conditions of certification: **BIO-28** Golden Eagle Monitoring and **BIO-29** In-Lieu Fee Mitigation Option. Conditions of Certification **BIO-12**, Desert Tortoise Compensatory Mitigation, and **BIO-19**, Special-Status Plant Species Mitigation, have been extensively revised and expanded. Revisions have been made in most other conditions of certification to address comments from the Applicant and other parties. **Biological Resources Table 22** summarizes the changes to the conditions of certification.

Compliance with Laws, Ordinances, Regulations, and Standards

The Project developer would need to comply with the following laws, ordinances, regulations, and standards (LORS) during Project construction and operation, as listed in **Biological Resources Table 1**.

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

Applicable LORS	Description
Federal	
Federal Endangered Species Act (Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and protects federally threatened and endangered plants and animals and their critical habitats.
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a)(26))	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge of dredged or fill materials into waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request state certification that the proposed activity will not violate state and federal water quality standards.
Eagle Act (Title 50, Code of Federal Regulations, section 22.26)	Would authorize limited take of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) under the Eagle Act, where the taking is associated with, but not the purpose of activity, and cannot practicably be avoided.
Eagle Act (Title 50, Code of Federal Regulations, section 22.27)	Would provide for the intentional take of eagle nests where necessary to alleviate a safety hazard to people or eagles; necessary to ensure public health and safety; the nest prevents the use of a human – engineered structure, or; the activity, or mitigation for the activity, will provide a net benefit to eagles. Only inactive nests would be allowed to be taken except in the case of safety emergencies.
Bald and Golden Eagle Protection Act (Title 16, United States Code section 668)	This law provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act.
Northern and Eastern Colorado Desert Coordinated Management Plan (NECO)	A regional amendment to the CDCA Plan approved in 2002, NECO protects and conserves natural resources while simultaneously balancing human uses in the northern and eastern portion of the Colorado Desert.
California Desert Protection Act of 1994 (CDPA)	An Act of Congress which established 69 wilderness areas, the Mojave National Preserve, expanded Joshua Tree and Death Valley National Monuments and redefined them as National Parks. Lands transferred to the National Park Service were formerly administered by the BLM and included substantial portions of grazing allotments, wild horse and burro Herd Management Areas, and Herd Areas.
Migratory Bird Treaty (Title 16, United	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the

Applicable LORS	Description
States Code, sections 703 through 711)	Migratory Bird Treaty Act.
Executive Order 11312	Prevent and control invasive species.
California Desert Conservation Area Plan	The California Desert Conservation Area (CDCA) comprises one of two national conservation areas established by Congress at the time of the passage of the Federal Land and Policy Management Act (FLPMA) in 1976. The FLPMA outlines how the BLM will manage public lands. Congress specifically provided guidance for the management of the CDCA and directed the development of the 1980 CDCA Plan.
Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994) and Draft Revised Recovery Plan (USFWS 2008a)	Describes a strategy for recovery and delisting of the desert tortoise.
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
Protected furbearing mammals (California Code of Regulations, Title 14, section 460)	Fisher, marten, river otter, desert kit fox and red fox may not be taken at any time.
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals of California that are declared rare, threatened, or endangered.
Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations Title 14, section 670.7).
Nest or Eggs (Fish and Game Code section 3503)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird.
Birds of Prey (Fish and Game Code section 3503.5	Unlawful to take, possess, or destroy any birds in the orders Falconiformes and Strigiformes or to take, possess, or destroy the nest or eggs of any such bird.
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds.
Nongame mammals (Fish and Game Code section 4150)	Makes it unlawful to take or possess any non-game mammal or parts thereof except as provided in the Fish and Game Code or in accordance with regulations adopted by the commission.
Significant Natural Areas (Fish and Game	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.

Applicable LORS	Description
Code section 1930 and following)	
California Environmental Quality Act (CEQA), CEQA Guidelines section 15380	CEQA defines rare species more broadly than the definitions for species listed under the state and federal Endangered Species Acts. Under section 15830, species not protected through state or federal listing but nonetheless demonstrable as “endangered” or “rare” under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFG’s Special Animals List.
Streambed Alteration Agreement (Fish and Game Code sections 1600 and following)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFG in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Native Plant Protection Act of 1977 (Fish and Game Code section 1900 and following)	Designates state rare, threatened, and endangered plants.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 and following and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.
Porter-Cologne Water Quality Control Act	Regulates discharges of waste and fill material to waters of the State, including “isolated” waters and wetlands.
Local	
Riverside County General Plan	Protection and preservation of wildlife for the maintenance of the balance of nature.

Desert Renewable Energy Conservation Plan – Interim Planning

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

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

The Energy Commission and CDFG are the primary state collaborators in the REAT, operating under a November 18, 2008 MOU between the two agencies to create a "one-stop process" for permitting renewable energy projects under their joint permitting authority. The BLM and the USFWS also participate in the REAT under a separate MOU signed in November 2008, which outlines the state and federal cooperation of the group. The October 12, 2009 MOU between California and the Department of Interior reiterates several tasks of the REAT provided for in S-14-08 and the Energy Commission-Fish and Game MOU.

The REAT's primary mission is to streamline and expedite the permitting processes for renewable energy projects in the Mojave and Colorado Desert ecoregions within the State of California, while conserving endangered species and natural communities at the ecosystem scale. To accomplish this goal the REAT Agencies are developing a Desert Renewable Energy Conservation Plan (DRECP), a science-based process for reviewing, approving, and permitting renewable energy applications in California. Once the DRECP is complete, anticipated in late 2012, the plan will provide tools to expedite coordination of federal and state endangered species act permitting. The DRECP will also offer a unified framework for state and federal agencies to oversee mitigation actions, including land acquisitions, for listed species.

The REAT Agencies recognize that some renewable energy projects are scheduled to be approved prior to completion of the DRECP. Section 8.9 of the October 2009 Draft Planning Agreement for the DRECP <www.energy.ca.gov/2009publications/...2009.../REAT-1000-2009-034.PDF> provides explicit guidance for such interim projects, and directs the REAT Agencies to ensure that permitting for these projects: be consistent with the preliminary conservation objectives for the DRECP; not compromise successful completion and implementation of the DRECP; facilitate Federal Endangered Species Act, California Endangered Species Act, National Environmental Policy Act, and California Environmental Quality Act compliance; and not be unduly delayed during preparation of the DRECP.

REAT Account and SBX8 34

The REAT agencies recently signed a Memorandum of Agreement (MOA) to establish a REAT Account that may be used by project developers to deposit funding for specified mitigation for approved renewable energy projects in the Mojave and Colorado Desert region of southern California (the MOA is available at <www.energy.ca.gov/33by2020>). For each project using the REAT Account an individual subaccount would be established for project specific tracking, compliance and accounting purposes. The subaccount would identify a list of the specific mitigation actions, the cost, and a timeframe for carrying out the actions. The National Fish and Wildlife Foundation (NFWF) would manage the subaccount on behalf of the REAT agencies, and at their direction would disburse mitigation funding to satisfy mitigation requirements for impacts

to biological resources. NFWF is a charitable non-profit corporation established in 1984 by the federal government to accept and administer funds to further the conservation and management of fish, wildlife, plants and other natural resources <hwww.nfwf.org>. Use of the REAT Account would not change any of the requirements a project proponent must fulfill in order to comply with applicable State and Federal environmental laws governing the permitting of the projects.

The REAT Account will also aid project proponents in carrying out contracting and construction activities in a timely manner per requirements for American Recovery and Reinvestment Act of 2009 (ARRA) funding. The SBX8 34 legislation that was recently signed into law by the Governor created a $10 million loan that provides for advanced mitigation habitat purchases. This advanced mitigation can be used by a qualifying solar renewable energy project to receive credit for implemented mitigation after a project proponent pays into the Renewable Energy Development Fee Trust Fund that was created by the SBX8 34 legislation (SBX8 34 Trust Fund). Funds in the MOA REAT Account and the SBX8 34 Trust Fund are similar in that renewable energy project proponents pay into accounts set up to receive project-specific mitigation funds, and a third party entity implements the mitigation actions. Staff's proposed Condition of Certification **BIO-29** provides an opportunity for the Applicant to fulfill their mitigation obligations by depositing funds into the SBX8 34 Trust Fund.

C.2.3 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 (Energy Commission) and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency, but the use of specific significance criteria is not required by NEPA.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines Section 15382).

Thresholds for determining CEQA significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. The determination of whether a project has a significant effect on biological resources is based on the best scientific and factual data that staff could review for the project. In this analysis the following impacts to biological resources are considered significant if the project would result in: a substantial adverse effect to plant species considered by the California Native Plant Society (CNPS), CDFG, or USFWS to be rare, threatened, or endangered in California or with strict habitat requirements and narrow distributions; a substantial impact to a sensitive natural community (i.e., a community that is especially diverse; regionally uncommon; or of special concern to local, state, and federal agencies); a substantial adverse effect to wildlife species that are federally-listed or state-listed or proposed to be listed; a

substantial adverse effect to wildlife species of special concern to CDFG, candidates for state listing, or animals fully protected in California; substantial adverse effects on habitats that serve as breeding, foraging, nesting, or migrating grounds and are limited in availability or that serve as core habitats for regional plant and wildlife populations; substantially interferes with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites; a substantial adverse effect on important riparian habitats or wetlands and any other "Waters of the U.S." or state jurisdictional waters; or conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

In contrast to CEQA, "significantly" as used in NEPA requires considerations of both context and intensity (40 CFR 1508.27). According to the NEPA Regulations adopted by the President's Council on Environmental Quality (CEQ) (40 CFR 1500-1508), context means the affected environment in which a proposed action would occur; it can be local, regional, national, or all three, depending upon the circumstances. In determining the intensity of an impact, the following factors are considered: adverse effects of a project even though the overall proposed action is beneficial; effects on public health or safety; unique characteristics of the geographic area, such as historic resources, park lands, prime farmland, wetlands, wild and scenic rivers, ecologically critical areas; degree of controversy; degree of highly uncertain effects or unique or unknown risks; precedent-setting effects; cumulative effects; adverse effects on scientific, cultural, or historical resources; adverse effects on endangered or threatened species or designated critical habitat (pursuant to the Endangered Species Act); and violations of federal, state, or local environmental law.
For NEPA, thresholds serve as a benchmark for determining if a project action would result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) be prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment."

C.2.4 PROPOSED PROJECT

C.2.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

Genesis Solar, LLC (Genesis Solar) is proposing development of their 250-megawatt (MW) solar generating facility within a 4,640-acre right-of-way (ROW) grant application from the Bureau of Land Management. Approximately 1,727 acres within the proposed ROW would be used for the solar power plant facility and 84 acres would be used for the linear facilities, collectively referred to as the Project Disturbance Area throughout the remainder of this Biological Resources Section (CEC 2010d). The Project Disturbance Area encompasses all areas to be temporarily and permanently disturbed including the following:

- "plant site" described by the applicant as the solar arrays, power blocks, power equipment, support facilities and evaporation ponds (TTEC 2009c);

- "linear facilities" including the access road, transmission line, natural gas pipeline (TTEC 2009c); and
- All areas disturbed by temporary access roads, fence installation, construction work lay-down and staging areas or by any other activities resulting in disturbance to soil or vegetation.

Interstate-10 is located approximately 2 miles south of the southernmost boundary of the ROW. The Project site occurs at elevations ranging from approximately 350 to 450 feet above mean sea level, approximately 25 miles west of the community of Blythe and 27 miles east of Desert Center, California in eastern Riverside County. The proposed Project would be located within the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) area. A detailed description of the Project is provided in section B.1. The Genesis Project would be located on the alluvial fan on the southern flank of the Palen Mountains in the Chuckwalla Valley.

Regional Setting

The Genesis Solar Energy Project (Project) would be located within the northeastern portion of Chuckwalla Valley, an area east of Palm Springs in the remote Colorado Desert, a subsection of the Sonoran Desert. The range of the Chuckwalla Valley is from 400 feet above mean sea level at Ford Dry Lake to approximately 1,800 feet above mean sea level along some of the bajadas that occur west of Desert Center, California with the surrounding mountains rising to over 3,000 above mean sea level (GSEP 2009a).

Hydrologically, the proposed Project site occurs in the Colorado River Basin within the Chuckwalla Valley Drainage Basin. This is an internally drained basin and all surface water flows to Palen Dry Lake in the western portion of Chuckwalla Valley and Ford Dry Lake in the eastern section of Chuckwalla Valley. Palen Dry Lake is characterized as a "wet playa" since it supports significant groundwater discharge at the ground surface by evaporation. Ford Dry Lake is characterized as a "dry playa" with groundwater sources occurring well below the surface of the dry lake bed and as a result receives occasional inflow of surface water (GSEP 2009a,f).

A number of Areas of Critical Environmental Concern (ACECs) and federally-designated Wilderness Areas occur within the vicinity of the Project site. The 236,488-acre Palen-McCoy Wilderness area abuts the plant site to the north. Within this wilderness area, there are five distinct mountain ranges with characteristic sloping bajadas: the Granite, McCoy, Palen, Little Maria, and Arica Mountains (BLM 2009). Two additional wilderness areas occur in the Project vicinity, the Little Chuckwalla Mountains and Chuckwalla Mountains wilderness areas (GSEP 2009a). The 3,632-acre Palen Dry Lake ACEC occurs about 10 miles west of the Project site and is managed for protection of its prehistoric resources. The 2,273-acre Chuckwalla Valley Dune Thicket ACEC occurs immediately west of the southern terminus of the proposed Project transmission line, and is managed for its wildlife habitat use, specifically for birds.

Vegetation and Wildlife

Upland Natural Communities

The Study area supports four major upland natural communities. The majority of the Project Disturbance Area supports Sonoran creosote bush scrub; the eastern portion of the Project Disturbance Area also supports stabilized and partially stabilized desert dunes. A small amount of playa and sand drifts over playa occur within the Project Disturbance Area along the margins of Ford Dry Lake. The larger surveyed area, the Study area, supports chenopod scrub, and desert wash woodland in addition to the two vegetation communities mentioned above (GSEP 2009a). All of these communities except the Sonoran creosote bush scrub are considered sensitive according to the NECO plan. These upland communities are discussed in more detail below and acreages are summarized in **Biological Resources Table 2**. Additionally, the southern linear facility route was determined by the applicant to support wash-associated, microphyll riparian woodland communities (GSEP 2009f, BIO-DR-70). Dry desert wash woodland and microphyllous riparian vegetation are described in detail in the following section, Waters of the State.

Sonoran Creosote Bush Scrub

A total of 1,773 acres of Sonoran creosote bush scrub occurs within the Project site; 1,713 acres occur in the solar power plant Disturbance Area and 60 acres occur along the linear Disturbance Area (CEC 2010d, TTEC 2010o). Sonoran creosote bush scrub occurs on well-drained, secondary soils of slopes, fans, and valleys and is the basic creosote scrub community of the Colorado Desert (Holland 1986). Within this community in the Project site, soils are generally sandy-loams with scattered areas of fine gravel. The dominant plant species within this community are creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), brittlebush (*Encelia farinosa*), white ratany (*Krameria grayi*), and cheesebush (*Hymenoclea salsola*).

Stabilized and Partially Stabilized Desert Dunes

Approximately 1 acre of stabilized and partially stabilized desert dunes occurs within the linear Disturbance Area along I-10 (CEC 2010d, TTEC 2010o). These dune systems are described as accumulations in the desert which are stabilized or partially stabilized by evergreen and/or deciduous shrubs and scattered, low grasses. These dunes typically occur lower than active dune systems and retain water just below the sand surface which allows deep-rooted, perennial vegetation to survive during longer drought periods. Shrub cover is lower in this community compared to Sonoran creosote bush scrub community in the Project site and shrubs become less sparse the closer to Ford Dry Lake. Where partially stabilized desert dunes intergrade with playas and the margins of Ford Dry Lake, fine sand drifts occur (GSEP 2009a, Appendix C). The dominant plant species associated with this community include four-wing saltbush (*Atriplex canescens*), desert croton (*Croton californicus*), and Colorado desert buckwheat (*Eriogonum deserticola*).

Playa and Sand Drifts Over Playa

A total of 37 acres of playa and sand drifts over playa occurs within the Project site in association with Ford Dry Lake; over 14 acres occur in the plant site Disturbance Area

and over 23 acres occur within the linear Disturbance Area (CEC 2010d). There is not a formal description of this natural community according to CDFG, Holland (1986), or Sawyer and Keeler-Wolf (1995). This community occurs in close association with stabilized and partially stabilized desert dunes within the Study area and shrub cover continues to decrease towards Ford Dry Lake. There are intermittent, shallow sand drift deposits along the margins of the playa within the Study area. Playas and sand drifts over playas provide food and foraging opportunities for many species of wildlife and also provide habitat for several common and special-status plant species.

Chenopod Scrub

A portion of chenopod scrub occurs within the Study area; since this vegetation community does not occur within the Project Disturbance Area, an acreage was not determined (GSEP 2009f). Holland identifies two types of chenopod scrub, desert saltbush scrub and desert sink scrub. These communities are usually comprised of low-growing, grayish, with microphyllous (small-leaved) shrubs and some succulent species. The total vegetative cover is often low with bare ground between widely spaced shrubs. Both types of chenopod scrub occur on poorly-drained soils with high alkalinity or salinity. These communities often occur on the margins of dry lake beds in the Colorado, Sonoran, Mojave, and Great Basin deserts typically below 4,000 feet in elevation (Holland 1986). Chenopod scrub provides habitat for many species of common and special-status plants, mammals, and reptiles as dispersal, foraging and cover habitat especially in association with other upland and desert wash communities.

Biological Resources Table 2
Upland Natural Communities within the GSEP Study Area

Natural Community Types within Study Area[3]	Solar Power Plant Site (Acres)	Linear Facilities (Acres)	Buffer Area (Acres)[1]	Total Surveyed (Acres)[2]
Upland				
Sonoran creosote bush scrub	1,713	60	14,370	16,143
Stabilized and partially stabilized desert dunes	0	1	3,903	3,904
Playa and sand drift over playa	14	23	4,781	4,818
Chenopod scrub	0	0	370	370
Total Upland	**1,727**	**84**	**23,424**	**25,235**

[1] For the purposes of this table and this Biological Resources Section, the portion identified within the buffer area of this table is the difference between the total surveyed area less the sum of plant site acreage and linear facilities acreages.
[2] Includes natural community types observed during field surveys out to one mile buffer from the Project ROW and 2,400 feet of linear facilities.
3 Acreages adjusted to reflect removal of the 41.4 acre “toe” (TTEC 2010o).

Waters of the State

A formal jurisdictional delineation for regulated waters was conducted by the Applicant to determine the extent of potential jurisdictional waters of the U.S. and/or waters of the State within the Project. This includes waters (and/or wetlands) regulated under the federal Clean Water Act and/or streams and associated habitat regulated under the California Fish and Game Code. The Applicant is requesting a jurisdictional determination of isolated waters (non-jurisdictional waters of the U.S.) from the U.S.

Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency and submitted an application for a Streambed Alteration Agreement (TTEC 2009d). The application to the USACE assumed there are no potential jurisdictional waters of the U.S. because the features occur in a closed basin with no identifiable outlet and have no direct hydrologic connection to any navigable waters. The USACE has not yet completed their jurisdictional determination, although they have tentatively concluded that drainages at the Project site would not fall under their jurisdiction as waters of the U.S. (Mace pers. comm.).

The Applicant submitted a Notification of a Lake or Streambed Alteration (TTEC 2009d) in December 2009 to CDFG, and in response to data requests from staff, submitted a revised jurisdictional delineation report and application in January 2010 (TTEC 2010j). The revised delineation also included waters and wash-dependent vegetation downstream of the Project footprint that are likely to be indirectly affected by the diversion of waters. CDFG staff conducted a field verification of the delineation of state waters on February 17, 2010, and made some recommendations for adjustments to the boundaries (CDFG 2010).These revised boundaries (TTEC 2010l) encompassed several additional drainages in the western portion of the Project, expanded the delineation of the jurisdictional features to encompass the full width of the floodplain, and included features that would be indirectly affected downstream of the engineered channel.

The total (91 acres) area of all waters of the state delineated within the Project Disturbance Area includes 16 acres of microphyllous riparian vegetation, also called desert dry wash woodland, and 74 acres of other ephemeral desert washes. A total of 21 acres of jurisdictional state waters, consisting of unvegetated ephemeral dry washes, were delineated downstream of the Project Disturbance Area, encompassing the full downstream reach of waters that would likely be indirectly affected by the diversion of waters at the upstream edge of the Project Disturbance Area, and then discharged at several points below the Project.

Hydrology

The Project area is within the Chuckwalla-Ford Dry Lake watershed. The primary hydrologic feature in the watershed is Ford Dry Lake, a closed basin, which is the receiving basin for 1,503 miles of unnamed desert washes, including the many smaller ephemeral desert washes that pass through the Project site and drain the southeastern flank of the Palen Mountains. The “Palen Wash” is the larger feature that drains the alluvial fan between the Palen and McCoy mountains and supports an old growth forest of ironwood on its upper reaches. The lower reaches of this feature passes through the western portion of the transmission line, natural gas line and access road alignment. The entire study area is crossed by numerous ephemeral washes ranging from small, weakly expressed erosional features to broad (over 10 feet wide) channels. The active flow channels are generally devoid of vegetation and typically have a sandy-gravel substrate, although some washes also contained cobble and scattered larger rocks. Small- to medium-sized washes are common and widespread throughout the entire Project area. The larger washes tend to dissipate into smaller, more braided channels as they progress downslope. The majority of the channels terminate prior to reaching Ford Dry Lake as well-defined conveyance features diminish and transition into broad,

shallow surface flow. All of the ephemeral washes identified in the Project area flow only in response to storm events.

Unvegetated Ephemeral Washes

The majority of washes identified throughout the study area are associated with Sonoran creosote bush scrub habitat. Species such as white bursage are common in some medium to large-sized washes, especially in braided channels that contain slightly elevated areas intermixed with the active flow channels. The larger washes (typically over 6 feet) that contain sandy, gravelly substrate and well-defined banks typically include big galleta grass and scattered desert wash tree species such as ironwood and palo verde. Ironwood and palo verde trees are sparsely scattered throughout the Project area and are associated with areas of heavier sheet flow.

Desert Dry Wash Woodland/Microphyllous Riparian Vegetation

Desert dry wash woodland is a sensitive vegetation community recognized by the CNDDB, BLM, and is also designated as state waters by CDFG (CDFG 2003, BLM CDD 2002). Desert dry wash woodland is an open to dense woodland of microphyllous desert riparian trees (Holland 1986).The Applicant has identified a stand of desert dry wash woodland as occurring east of the Project area, within the large Palen Wash, but had described this habitat type as absent from the Project area (GSEP 2009a). In their revised delineation the Applicant describes areas of areas of microphyllous riparian vegetation occurring in washes along the linear Disturbance Area. The microphyllous vegetation identified in these washes consists of three tree species (palo verde, ironwood, and honey mesquite) and totals 16 acres (TTEC 2010). Within the proposed Project area ironwood and palo verde occur in low densities but one wash along the linear facility route, identified as Wash 24-26 in the jurisdictional delineations report (TTEC 2010l) supports a relatively dense concentration of 270 palo verde trees. Wash 31 consists of honey mesquite and is also relatively dense.

<u>Habitat Function and Value of State Waters</u>

The Project area's ephemeral washes, both vegetated and unvegetated, provide unique habitat that is distinct from the surrounding uplands, providing more continuous vegetation cover and microtopographic diversity than the surrounding uplands, migration corridors, and refuge, for a variety of wildlife. Both the wash-dependent and upland vegetation along these washes drive food webs, provide seeds for regeneration, habitat for wildlife, access to water, and create cooler, more hospitable microclimatic conditions essential for a number of plant and animal species. The vegetation, whether dominated by woodland trees or shrubs and perennial herbs, contributes channel roughness that reduces the velocity of floodwaters and provides organic matter for soil development and nutrient cycling (USEPA 2008).

Because ephemeral and intermittent stream channels have a higher moisture content and more abundant vegetation than the surrounding areas, they are very important to wildlife. Frequently, these streams may retain the only available water in the area, with permanent pools interposed wherever hydrogeological conditions allow (USEPA 2008). The short duration and episodic flood pulses of surface and overbank flow is important as it allows some species to complete important life-history developmental stages. The habitat provided by desert streams contracts and expands dramatically in size due to

the extreme variations in flow, which can range from high-discharge floods to periods when surface flow is absent. This spatial variation in habitat or ecosystem size is a fundamental, defining feature of these streams (Smith et al. 1995, USEPA 2008).

Groundwater-Dependent Vegetation Communities in the Project Vicinity

Groundwater elevation contour mapping done by Steinemann (1989) suggests that groundwater levels are very close to the ground surface beneath the northwestern 25 percent of Palen Dry Lake (Worley Parsons 2009), approximately three to six miles from the Project's proposed groundwater pumping well and at Ford Dry Lake, near the Project, the water table was measured at 80 feet, extending to a depth of 200 feet. The groundwater-dependent plant communities ("phreatophytes") outside of the Project Disturbance Area are included because they are within the Applicant's estimated area of water table drawdown by the end of operation, a 9 to 10-mile radius from the Project pumping well, and because these are sensitive communities recognized by the California Natural Diversity Data Base (CDFG 2003) and BLM. Some woody pPhreatophytes are documented to root to depths of over 100 feet.

Mesquite Bosque and Other Phreatophytes

In the Chuckwalla Valley Groundwater Basin the groundwater is too deep to support shallow marshes and meadows, but it does support communities of deeper-rooted, groundwater-dependent "phreatophytes", most notably the shrubby "bosques" (groves) of honey mesquite around the open, unvegetated playa. Mesquite bosques are a rare and sensitive community recognized by BLM and the CNDDB (CDFG 2003). They occur in areas with access to permanent and stable groundwater; the deep roots can tap water supplies up 40 feet below the surface, although tap roots as long as 190 feet have been documented (Sosebee & Chan 1989). When available, mesquite will exploit sources of deep water by growing a taproot. Mesquite can also persist on sites that have little or no ground water by growing lengthy shallow lateral roots. In some parts of their range they are considered "facultative phreatophytes" that function as phreatophytes if unlimited water is available, but are capable of surviving on sites with limited soil water. In California, however, they are very rare outside of washes or areas with available groundwater; they also occur as a decumbent or running bush found on coppice dunes (vegetated sand mounds). These adaptations allow honey mesquite to retain most leaves in all but the most severe droughts (Ansley et al 2004). In the Project vicinity, they are found along the northwest and southwest margins of Palen Dry Lake on small coppice dunes. They have also been documented elsewhere in Chuckwalla Valley (Evans and Hartman 2007) and observed by staff in aerial photos on the southwest margin of Palen Dry Lake.

Mesquite could provide critical refugia for wildlife during these extended droughts, due to the mesquite's ability to draw water from deep sources and then create a relatively mesic oasis at the surface (Barrows pers. comm.). The fruit of honey mesquite is valuable forage for wildlife; it is quite predictable, even in drought years, annually providing an abundant and nutritious food source for numerous wildlife species upon ripening in summer (Steinberg 2001). The fruit's pericarp is high in sugars and the seeds contain large amounts of protein. Where they occur, honey mesquite seeds form an important part of the diet of mice, kangaroo rats, ground squirrels, quail, black-tailed jackrabbit, mule deer, and many other wildlife. Mesquite flowers are eaten by numerous

bird species. Quail and many other birds eat mesquite buds and flowers in the spring and seeds during the fall and winter. Western honey mesquite communities often attract large numbers of birds that feed on the mistletoe fruit.

Microphyll Woodland

Other known phreatophytes in the Project area include the native trees ironwood, palo verde, and cat's claw; the invasive exotic salt cedar (tamarisk), and the native chenopod shrub bush seep-weed. Most of the microphyllous trees (ironwood, palo verde, cat's claw) occur along the many desert washes in the Project area. The best examples are described under "Desert Dry Wash Woodland/Microphyllous Riparian Vegetation", above. However, these deep-rooted trees also occur away from the streams on portions of the bajada (above and below the Project) where they have access to deep groundwater. Desert phreatophytes are legendary for their deep-rooting. One mesquite was documented to root to a depth of over 250 feet in a mine shaft, although most are documented to root at depths up to 40 feet (Sosebee & Chan 1989). They are also observed to occur sporadically around the perimeter of Ford Dry Lake, where the water table is measured at 80 feet. It is unclear at this time whether they are supported by the shallow groundwater table under Ford Dry Lake or by the mountain front aquifer, or surface runoff.

Bush Seep-Weed Alkali Sink Scrub

Other known phreatophytes observed within the zone potentially influenced by Project or cumulative groundwater pumping include succulent chenopod scrubs dominated by bush seep-weed, which forms pure stands over large areas around the margins of Palen Dry Lake. It also occurs sporadically around Ford Dry Lake, where it co-occurs with the xerophyte saltbush. Bush seep-weed is a characteristic component of alkali sinks, a phreatophyte (Barbour et al. 2007) occupying fine-textured saline soils on or around the playa margins, and rooting to depths of several meters to access groundwater (Patten et al. 2007).

Sand Transport System

This subsection provides a brief explanation of wind transport of sand relative to the creation, preservation and destruction of sand dunes in the Project area. **Soil & Water Appendix A** provides a more detailed explanation, as does the "*Aeolian Transport Evaluation and Ancient Shoreline Delineation Report, Genesis Solar Energy Project, Riverside County, California*" (Worley Parsons 2010). Movement of sand by wind and water is relevant to sensitive biological resources because these geomorphic processes create and maintain habitat for Mojave fringe-toed lizards and other species dependent on fine, wind-blown sand.

Two sand migration corridors occur in the vicinity of the Project. The Palen-Dry Lake (PDL) -Chuckwalla Valley Sand Corridor is located immediately to the south of the Project site, and is a major aeolian sand transport moving sand east along the Chuckwalla Valley toward the Colorado River (see Plate 5 in Worley Parsons 2010c). This is a regionally-significant geomorphic feature that provides sand to build and support sand dune habitat in the Project vicinity. To the east of the Project site is the Palen-McCoy Valley Sand Corridor, which moves sand to the south from the valley between the Palen and McCoy mountains. In addition, the regional wind transport

system can also be transported locally by washes. These carry sediment from upstream sand corridors and distribute it on the alluvial fan where it is available for wind transport, creating smaller sand corridors around the main washes.

Noxious Weeds

Noxious weeds are species of non-native plants included on the weed lists of the California Department of Food and Agriculture (CDFA) (CDFA 2007), the California Invasive Plant Council (Cal-IPC), or those weeds of special concern identified by the BLM. They are of particular concern in wild lands because of their potential to degrade habitat and disrupt the ecological functions of an area (Cal-IPC 2006). Specifically, noxious weeds can alter habitat structure, increase fire frequency and intensity, decrease forage (including for special-status species, such as desert tortoise), exclude native plants, and decrease water availability for both plants and wildlife. Soil disturbance and gathering and channeling water create conditions favorable to the introduction of new noxious weeds or the spread of existing populations. Construction equipment, fill, and mulch can act as vectors introducing noxious weeds into an area.

Non-natives species were recorded as a part of Project surveys; additional baseline surveys to identify population locations and densities are pending (TTEC 2010g). Four noxious weed species were observed within the study area: Sahara mustard, Russian thistle, salt cedar, and Mediterranean grass. Each of these species is identified on a list of the region's worst weeds compiled by the Low Desert Management (NRCS 2005). Noxious weeds found in the study area are discussed further below.

Sahara Mustard

Sahara mustard (*Brassica tournefortii*) was widespread throughout the Project study area, including in Sonoran creosote bush scrub, in and contributed to a relatively large portion of the plant biomass. There were patches of higher concentrations occurring within runnels, along the existing two-track road on the western side of the ROW, and along the linear facility routes (TTEC 2010g). This species is of high concern; it is a BLM weed of special concern and Cal-IPC has declared this plant highly invasive (Cal-IPC 2006) and recommends that it should be eradicated whenever encountered. This species is associated with impacts to habitat for native wildlife as well as for native plants. It promotes the spread of fire by increasing fuel load and competes with native plants for moisture and nutrients. In addition, it increases cover and works to stabilize sand, thereby affecting wildlife species dependent on open sandy habitat (Brossard et al. 2000; Barrows and Allen 2007).

Russian Thistle

Russian thistle (*Salsola* sp.) was common in the dune areas on the east side of the Project area and along the linear facilities (TTEC 2010g). Although all invasive plants share the trait of being adapted to disturbed habitat, Russian thistle or tumbleweed particularly tends to be restricted to roadway shoulders and other sites where the soil has been recently disturbed. However, once an area is disturbed this species competes readily and can affect native plant ecosystems and increase fire hazard (Orloff et al. 2008; Lovich 1999). Dune habitat is particularly vulnerable to non-native species, which can stabilize sand or block sand movement, and Russian thistle is considered an invasive species of primary concern in this habitat (CDFG 2007). There is a high

potential that Russian thistle could become established in the construction area and this species should be eradicated if observed. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006) and the CDFG has given it a “C” rating.

Mediterranean Tamarisk

Mediterranean tamarisk or salt cedar (*Tamarix ramosissima*) is a riparian plant and is therefore restricted to habitats where there is perennial saturation such as springs and seeps, or runoff from poorly maintained water pipelines or well pumps. It was observed south of the Project area on the edge of the dry lake bed (GSEP 2009a) and by staff south of I-10 along the transmission line route. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006) and it is a CDFG “B” rated species. Salt cedar is associated with many ecological impacts including impacts to channel geomorphology, groundwater availability, plant species diversity, and fire frequency (Lovich 1999). Salt cedar can also affect sand dunes by blocking sand movement, a vital part of the natural function of these habitats (CDFG 2007).

Mediterranean Grass

Mediterranean grass (*Schismus arabicus, S. barbatus*) is prevalent throughout the Project area (TTEC 2010g). Mediterranean grass is an annual that reproduces by seed, and is widespread in arid and semi-arid California landscapes. This species competes effectively with native plants for nutrients and water and can provide cover that prevents native annuals from sprouting (VanDevender et al. 1997; Brossard et al. 2000) and contributes to dune stabilization (CDFG 2007). Fire, historically, was rare in the Colorado Desert. The presence of Mediterranean grass on other annual non-native grasses has provided a continuous and increased fuel load, influencing the extent, frequency, and intensity of fire in these ecosystems (Brooks and Pyke 2001; Brooks et al. 2004). BLM and other agencies recognize that because of the widespread distribution of Mediterranean grass, this species is not considered feasible to eradicate, but is still subject to monitoring and control requirements.

Special-Status Species

Special-status species are plant and wildlife species that have been afforded special recognition by federal, state, or local resource agencies or organizations. Listed and special-status species are of relatively limited distribution and typically require unique habitat conditions. Special-status species are defined as meeting one or more of the following criteria:

1. Listed as threatened or endangered or candidates for future listing as threatened or endangered under CESA or FESA;

2. Protected under other regulations (e.g. Migratory Bird Treaty Act);

3. Listed as species of concern by CDFG;

4. A plant species considered by the CNPS to be "rare, threatened, or endangered in California" (CNPS List 1A, 1B, and 2) as well as CNPS List 3 and 4[1] plant species;

5. A plant listed as rare under the California Native Plant Protection Act[2];

6. Considered a locally significant species, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region or is so designated in local or regional plans, policies, or ordinances; or

7. Any other species receiving consideration during environmental review under CEQA.

The BLM designates Sensitive species as those requiring special management considerations to promote their conservation and reduce the likelihood and need for future listing under FESA. BLM Sensitive species include all Federal Candidate and Federally Delisted species which were so designated within the last 5 years, and CNPS List 1B species that occur on BLM lands. For the purposes of this analysis, Energy Commission staff considers all BLM Sensitive species as special-status species.

Biological Resources Table 3 lists all special-status species evaluated during the analysis that are known to occur or could potentially occur in the Project area and vicinity. Special-status species (or their sign) observed during the 2009 field surveys are indicated by **bold-face type**. Special-status species listed in **Table 3** that were detected or considered likely to occur based on known occurrences in the vicinity and suitable habitat present within the Project area are discussed in more detail below. The rest of these species have no or low-to-moderate potential to occur in the Project area and are described in **Biological Resources Table 4**.

Biological Resources Table 3
Special-Status Species Known or Potentially Occurring in the GSEP Study Area

PLANTS		
Common Name	**Scientific Name**	**Status State/Fed/CNPS/BLM/ Global Rank/State Rank**
Chaparral sand verbena	*Abronia villosa* var. *aurita*	__/__/1B.1/__/G5T3T4/S2.1
Angel trumpets	*Acleisanthes longiflora*	__/__/2.3/__/G5/S1.3

[1] List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity should be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. CNPS List 3 and 4 may be considered regionally significant if, e.g., the occurrence is located at the periphery of the species' range, or exhibits unusual morphology, or occurs in an unusual habitat/substrate. For these reasons, CNPS List 3 and 4 plants should be included in the field surveys. List 3 and 4 plants are also included in the California Natural Diversity Database's (CNDDB) Special Plants, Bryophytes, and Lichens List. [Refer to the current online published list available at: http://www.dfg.ca.gov/biogeodata.] Data on Lists 3 and 4 plants should be submitted to CNDDB. Such data aids in determining or revising priority ranking (CDFG 2009).

[2] As defined by the California Native Plant Protection Act, a plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901) (CDFG 2009).

PLANTS		
Common Name	**Scientific Name**	**Status State/Fed/CNPS/BLM/ Global Rank/State Rank**
Desert sand parsley	*Ammoselinum giganteum*	__/__/2.3/__/G2G3/SH
Small-flowered androstephium	*Androstephium breviflorum*	__/__/2.2/__/G5/S2
Harwood's milk-vetch	***Astragalus insularis* var. *harwoodii***	**__/__/2.2/__/G5T3/S2.2?**
Coachella Valley milk-vetch	*Astragalus lentiginosus* var. *coachellae*	__/FE/1B.2./S/G5T2/S2.1
California ayenia	*Ayenia compacta*	E/__/2.3/__/G4/S3.3
Pink fairy duster	*Calliandra eriophylla*	__/__/2.3/__/G5/S2.3
Sand evening-primrose	*Camissonia arenaria*	__/__/2.2/__/G4?/S2
Crucifixion thorn	*Castela emoryi*	__/__/2.3/__/G3/S2.2
Abram's spurge	*Chamaesyce abramsiana*	__/__/2.2/__/G4/S1.2
Arizona spurge	*Chamaesyce arizonica*	SR/__/2.3/__/G5/S1.3
Flat-seeded spurge	*Chamaesyce platysperma*	__/__/1B.2/S/G3/S1.2?
Las Animas colubrina	***Colubrina californica***	**__/__/2.3/__/G4/S2S3.3**
Spiny abrojo/Bitter snakeweed	*Condalia globosa* var. *pubescens*	__/__/4.2/__/G5T3T4/S3.2
Foxtail cactus	*Coryphantha alversonii*	__/__/4.3/__/G3/S3.2
Ribbed cryptantha	***Cryptantha costata***	**__/__/4.3/__/G4G5/S3.3**
Winged cryptantha	*Cryptantha holoptera*	__/__/4.3/__/G3G4/S3?
Wiggins' cholla	*Cylindropuntia wigginsii (syn=Opuntia wigginsii)*	__/__/3.3/__/G3?Q/S1.2?
Utah vining milkweed	*Cynanchum utahense*	__/__/4.2/__/G4/S3.2
Glandular ditaxis	*Ditaxis claryana*	__/__/2.2/__/G4G5/S1S2
California ditaxis	*Ditaxis serrata* var. *californica*	__/__/3.2/__/G5T2T3/S2.2
Harwood's eriastrum	***Eriastrum harwoodii***	**__/__/1B.2/BLM/G2/S2**
California satintail	*Imperata brevifolia*	__/__/2.1__/G2/S2.1
Cottontop cactus	*Echinocactus polycephalus* var. *polycephalus*	__/__/__/__/__/__
Pink velvet mallow	*Horsfordia alata*	__/__/4.3/__/G4/S3.3
Bitter hymenoxys	*Hymenoxys odorata*	__/__/2/__/G5/S2
Spearleaf	*Matelea parvifolia*	__/__/2.3/__/G5?/S2.2
Argus blazing star[3]	*Mentzelia puberula*	__/__/__/__/__/__
Slender woolly-heads	*Nemacaulis denudata* var. *gracilis*	__/__/2.2/__/G3G4T3?/S2S3
White-margined penstemon	*Penstemon albomarginatus*	__/_ /1B.1/S/G2/S1
Lobed cherry	*Physalis lobata*	__/__/2.3/__/G5/S1.3
Desert portulaca	*Portulaca halimoides*	__/__/4.2/__/G5/S3
Desert unicorn plant	***Proboscidea althaeifolia***	**__/__/4.3/__/G5/S3.3**
Orocopia sage	*Salvia greatae*	__/__/1B.3./S/G2/S2.2
Desert spikemoss	*Selaginella eremophila*	__/__/2.2./__/G4/S2.2?
Cove's cassia	*Senna covesii*	__/__/2.2/__/G5?/S2.2
Mesquite nest straw	*Stylocline sonorensis*	__/__/1A/__/G3G5/SX
Dwarf germander	*Teucrium cubense* ssp. *depressum*	__/__/2.2/__/G4G5T3T4/S2
Jackass clover	*Wislizenia refracta* ssp. *refracta*	__/__/2.2/__/G5T5?/S1.2?
Palmer's jackass clover[4]	*Wislizenia refracta* ssp. *palmeri*	__/__/Proposed 1B/__/__/__
Atriplex sp. nov. ("Palen Lake atriplex")	*Atriplex* sp. nov J. Andre	__/__/Proposed ?/__/__/__

[3] Proposed new addition to the CNPS Inventory (Andre, pers. comm.)
[4] Proposed new addition to the CNPS Inventory (Silverman, pers comm.)

WILDLIFE		
Common Name	**Scientific Name**	**Status State/Federal**
Reptiles/Amphibians		
Desert tortoise	***Gopherus agassizii***	**ST/FT**
Couch's spadefoot toad	*Scaphiopus couchii*	CSC/__/BLM Sensitive
Mojave fringe-toed lizard	***Uma scoparia***	**CSC/BLM Sensitive**
Desert rosy boa	*Charina (Lichanura) trivirgata*	__/__
Chuckwalla	*Sauromalus obesus*	__/__
Birds		
Western burrowing owl	***Athene cunicularia hypugaea***	**CSC/BCC/BLM Sensitive**
Golden eagle	*Aquila chrysaetos*	CFP/__/BLM Sensitive
Short-eared owl	***Asio flammeus***	**CSC**
Ferruginous hawk	***Buteo regalis***	**WL/BLM Sensitive**
Swainson's hawk	***Buteo swainsoni***	**ST**
Prairie falcon	***Falco mexicanus***	**WL**
American peregrine falcon	*Falco peregrinus anatum*	SFP
Vaux's swift	*Chaetura vauxi*	CSC
Mountain plover	*Charadrius montanus*	CSC/__/BLM Sensitive
Northern harrier	***Circus cyaneus***	**CSC**
Gilded flicker	*Colaptes chrysoides*	SE
Yellow warbler	*Dendroica petechia sonorana*	CSC
California horned lark	***Eremophila alpestris actia***	**WL**
Yellow-breasted chat	*Icteria virens*	CSC
Loggerhead shrike	***Lanius ludovicianus***	**CSC/BCC**
Gila woodpecker	*Melanerpes uropygialis*	SE
Black-tailed gnatcatcher	*Polioptila melanura*	__/__
Purple martin	*Progne subis*	CSC
Vermilion flycatcher	*Pyrocephalus rubinus*	CSC
Brewer's sparrow	***Spizella breweri***	**BCC**
Bendire's thrasher	*Toxostoma bendirei*	CSC/__/BLM Sensitive
Crissal thrasher	*Toxostoma crissale*	CSC
Le Conte's thrasher	***Toxostoma lecontei***	**WL/BCC/Sensitive**
Mammals		
Pallid bat	*Antrozous pallidus*	CSC/__ /BLM Sensitive
Townsend's big-eared bat	*Corynorhinus townsendii*	CSC/__/BLM Sensitive
Spotted bat	*Euderma maculatum*	CSC/__/ BLM Sensitive
Western mastiff bat	*Eumops perotis californicus*	CSC/__/ BLM Sensitive
Hoary bat	*Lasiurus cinereus*	__/__
California leaf-nosed bat	*Macrotus californicus*	CSC/__/ BLM Sensitive
Arizona myotis	*Myotis occultus*	CSC
Cave myotis	*Myotis velifer*	CSC/__/ BLM Sensitive
Yuma myotis	*Myotis yumanensis*	__/__/BLM Sensitive
Colorado Valley woodrat	*Neotoma albigula venusta*	__/__
Pocket free-tailed bat	*Nyctinomops femorosaccus*	CSC
Big free-tailed bat	*Nyctinomops macrotis*	CSC

WILDLIFE		
Common Name	**Scientific Name**	**Status State/Federal**
Burro deer	***Odocoileus hemionus eremicus***	**__/__/__**
Nelson's bighorn sheep	*Ovis canadensis nelson*	__/BLM Sensitive
Yuma mountain lion	*Puma concolor browni*	CSC
American badger	***Taxidea taxus***	**CSC**
Desert kit fox	***Vulpes macrotis arsipus***	**__/__**

Sources: CNDDB 2010

Status Codes:

Federal FE = Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT = Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities <www.fws.gov/migratorybirds/reports/BCC2002.pdf>

State CSC = California Species of Special Concern Species of concern to CDFG because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
SE = State listed as endangered
ST = State listed as threatened
CFP = California Fully Protected
WL = State watch list
SR = State-listed rare; Plant species listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 et seq.). A plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901)

California Native Plant Society
List 1B = Rare, threatened, or endangered in California and elsewhere
List 2 = Rare, threatened, or endangered in California but more common elsewhere
List 3 = Plants which need more information
List 4 = Limited distribution – a watch list
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

Bureau of Land Management
BLM Sensitive = Species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. BLM Sensitive species also include all Federal Candidate species and Federal Delisted species which were so designated within the last 5 years and CNPS List 1B plant species that occur on BLM lands.
http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.43545.File.dat/6840.pdf.

Global Rank/State Rank
Global rank (G-rank) and **State rank (S-rank)** is a reflection of the overall condition of an element throughout its global (or **State)** range. Subspecies are denoted by a T-Rank; multiple rankings indicate a range of values. **State rank (S-rank)** is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank. An H-rank indicates that all sites are historical
G1 or S1 = Critically imperiled; Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals
G2 or S2 = Imperiled; 6-20 EOs OR 1,000-3,000 individuals
G3 or S3 = Rare, uncommon or threatened, but not immediately imperiled; 21-100 EOs OR 3,000-10,000 individuals
G4 or S4 = Not rare and apparently secure, but with cause for long-term concern; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 or S5= Demonstrably widespread, abundant, and secure.

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

Special-Status Plant Species

As shown in **Biological Resources Table 3**, several special-status plant species have the potential to occur within the study area. Thirteen of these species were either observed during botanical and wildlife field surveys performed during spring 2009 and 2010 and/or considered to have moderate to high potential for occurrence, based on suitable habitat and/or known occurrences in the region, including:

- Harwood's eriastrum
- Harwood's milk-vetch
- Ribbed cryptantha
- Desert unicorn plant
- Abram's spurge
- Las Animas colubrina
- Flat-seeded spurge
- Glandular ditaxis
- California ditaxis
- Lobed ground cherry
- Dwarf germander
- Palmer's jackass clover
- Jackass clover
- Winged cryptantha
- Utah vining milkweed, and a
- New undescribed taxon of saltbush (*Atriplex* sp. nov.)

Harwood's eriastrum

Harwood's eriastrum, also known as Harwood's phlox or woollystar, is a BLM Sensitive spring annual currently known from only 14 documented locations worldwide. It is CNPS List 1B.2 species, which indicates it is rare, threatened, or endangered throughout its range. It is a California endemic with a global range restricted to San Diego, Riverside, and San Bernardino counties, typically in dunes associated with the margins around dry lakes such as Dale, Cadiz, and Soda lakes. Recently, surveys conducted in spring of 2010 for the Blythe Solar Project located this plant primarily in the sandy areas south of I-10, where 2,134 plants were located and mapped (AECOM 2010d). All of these plants were identified in the general vicinity of the proposed SCE Colorado River substation. Staff considers all stabilized and partially stabilized dunes to be suitable habitats for this species in the study area.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 2 new occurrences that were not in the CNDDB. Both of these are historical records from 1939 and 1958. Of the total of 14 occurrences in California (12 CNDDB plus two additional historic records), three of these are protected under Park Service or State Park ownership. A total of three records are historical records. Four of these occurrences have documented threats, including OHV and non-native plant impacts.

Harwood's Milk-vetch

Harwood's milk-vetch is a CNPS 2.2 species, meaning that is it fairly threatened in California, but more common elsewhere. It is also a covered species under NECO. It

has a CNDDB (NatureServe) Global rank of G5T3/S2.2; which denotes a subspecies that is rare, uncommon or threatened, but not immediately imperiled, and its occurrences in California are threatened. It is an annual herb that mainly occurs in Sonoran desert scrub habitat throughout the Colorado Desert (BLM CDD 2002). This subspecies is found in desert dunes and sandy or gravelly areas throughout the Mojavean and Sonoran deserts covering portions of Imperial, Riverside, and San Diego counties (CNPS 2009). Historic and recent collections include Ogilby Road in Imperial County and three locales west of Blythe, the Pinto Basin, and Chuckwalla Basin in Riverside County. Harwood's milk-vetch has also been reported from Baja California, Sonora Mexico, and portions of Yuma County, Arizona (Reiser 1994). There are several CNDDB records for this species within the Project vicinity (CNDDB 2010).

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 3 new occurrences that were not in the CNDDB. All of these are historical occurrences. Of the total 46 occurrences in California (CNDDB plus new additional occurrences), 9 of these are protected under Park Service or State Park ownership. A total of 11 records are historical records. Sixteen of these occurrences have documented threats including development, OHV, agriculture, transmission lines, road maintenance, and trash dumping.

Preliminary surveys performed during spring 2010 identified several hundred (700+) plants of Harwood's milk-vetch along the previously unsurveyed areas (TTEC 2010m). In addition, several Harwood's milk-vetch occurrences were identified in the general vicinity of the proposed SCE Colorado River substation. Spring 2009 surveys identified twelve plants of Harwood's milk-vetch in the Study area, two within solar power plant Disturbance Area and 10 within the linear Disturbance Area.

Ribbed Cryptantha

Ribbed cryptantha is a CNPS 4.3 species, meaning that it has limited distribution in California, but it is not very threatened in California. It typically occurs in loose friable soils in the eastern Mojave and Sonoran deserts in Imperial, Riverside, San Diego, and San Bernardino counties and into Arizona and south to Baja California, Mexico (CNPS 2009). It commonly occurs in stabilized and partially stabilized desert dunes and sandy areas of Sonoran and Mojavean desert creosote bush scrub. There are 116 records of this species from several locations throughout Riverside, Imperial, San Diego, and Imperial counties in the Consortium of California Herbaria database; the nearest collection is from the Palen Valley approximately three miles east of the Desert Center Airport (CCH 2010).

Spring 2009 surveys identified a single population of a few ribbed cryptantha northwest of the Wiley's Well rest area at approximately 380 feet elevation from an area of mixed sand drifts, hummocks with Patton tank tracks with widely scattered shrubs (GSEP 2009f). Preliminary survey findings from spring 2010 identified large populations (estimated in the tens of thousands) of ribbed cryptantha in the previously unsurveyed areas and buffer area (TTEC 2010m). In addition, another large population of ribbed cryptantha plants and a large occupied habitat area of this species were identified in the general vicinity of the proposed SCE Colorado River Substation (TTEC 2010o). This area occurs along the southern linear corridor route north of I-10. This species was

identified in an area mapped as stabilized and partially stabilized desert dunes during March 2009 surveys and in close association with other areas mapped as playa and sand drifts and Sonoran creosote bush scrub with similar habitat qualities.

Desert Unicorn Plant

Desert unicorn plant is a CNPS List 4.3 plant species, meaning it has limited distribution, but is not very threatened in California. This is a covered species under NECO. This is a low-growing, perennial species that occurs in sandy washes within Sonoran desert scrub habitats in San Bernardino, Imperial, Riverside, and San Diego counties of California. There are 13 records known from the NECO planning area in Milipitas Wash, Chuckwalla Valley, and Chemehuevi Valley (BLM CDD 2002). The blooming period for this species is from May to August (CNPS 2009) although is also known to flower between July and September after substantial summer rains (GSEP 2009a). It has a fleshy root system that can remain dormant in dry years.

As a CNPS List 4, it is not tracked in CNDDB but there are 36 records in the Consortium of California Herbaria, several of which are from the Chuckwalla Mountains and Desert Center area, including the Project area (CCH 2010).

During 2009 spring field surveys, a total of 22 seed pods of this typically summer-blooming perennial were found within the Study area, 5 within the solar power plant Disturbance Area and 17 along the linear Disturbance Area (GSEP 2009f). According to the Biological Resources Technical Report, seed pods were found as evidence of this species occurring in the Project area (75 seed pods and 1 individual plant) (GSEP 2009a, Appendix C). Preliminary results from spring 2010 surveys identified several hundred seed pods and individual plants of desert unicorn plants along the transmission line and buffer area (TTEC 2010m).

Abram's Spurge

Abram's spurge is a CNPS List 2.2 species meaning it is fairly rare in California but more common elsewhere (CNPS 2009). Habitat consists of sandy flats in creosote bush scrub habitat from approximately 600 to 2,700 feet above mean sea level. This ephemeral desert annual occurs in halophytic scrub flats, playas, and along inlets and floodplains of playas and always seems to prefer the lower floodplain ecotone but can also extend higher up into floodplains where braided drainages nexus with dune-mesquite-saltbush-galleta associations (Silverman, pers. comm.). Based on fourteen Consortium of California Herbaria database records for this species, habitats in Riverside, San Diego, and Imperial counties consist of sandy soil habitats often along dry lake margins, whereas documented occurrences in San Bernardino County occur on coarser, possibly sandy loams. Abram's spurge occurs from San Bernardino County to Imperial and eastern San Diego counties to Arizona, Nevada, Mexico, and Baja California (GSEP 2009f). The CNDDB (CNDDB 2010) lists 15 occurrences of this plant within the Riverside, Imperial, San Bernardino, and San Diego counties in California, east through Nevada to Arizona, and as far south as Baja California, Mexico. Of the total of 15 occurrences in California, seven of these are protected under Park Service, CDFG, or State Park ownership. A total of four records are historical records and one of these occurrences has documented threats which include grazing. A recent 2000 CNDDB record is from a location near the Project site; approximately 0.50 mile east of

Ford Dry Lake on Gasline Road just south of I-10, and reported as a “substantial population” (CNDDB 2010).

The blooming period is identified by CNPS as September through November (CNPS 2009). Since the Project site occurs in the Chuckwalla Valley of the Sonoran Desert, an area known for bi-modal rain patterns and late summer/fall rains, this species typically only blooms during summer or fall months following monsoonal rains (>+/- 0.10 inch) (Silverman pers. comm.). On average, August receives the most rainfall, although rainfall is also received during winter months of December, January, and February. Regional botanical experts have concluded that this, and other summer annuals, may be missed if surveys are only conducted within the mid-March through mid-April window, and that a full inventory at multiple temporal windows are necessary in order to capture all appropriate growing conditions (typically following 12 to 18 mm rain events) (CEC 2009d).

Abram’s spurge is a late-summer, early-fall blooming plant species and was therefore not targeted or detectable during field surveys which were performed during March and April 2009. Based on preliminary survey results from spring 2010, this species has not been identified within the study area (TTEC 2010m). Given the presence of suitable habitat within the Study area, and a recent CNDDB record immediately south of the Project Disturbance Area near Ford Dry Lake, Abram’s spurge could occur anywhere in the Project Disturbance Area in a wet summer but it is most likely to occur in the washes, playa margins, dune swales and other low-lying areas where moisture can collect.

Las Animas Colubrina

Las Animas colubrina is a CNPS List 2.3 species indicating it is not very endangered in California and more common elsewhere (CNPS 2009). This is a covered species under NECO. It is an evergreen to semi-evergreen shrub that occurs in Mojavean and Sonoran desert scrub (creosote bush series) and occurs at elevations from approximately 30 to 3,000 feet. It primarily occurs in dry canyons or headwater reaches of desert washes with gravelly, sandy soils. The distribution of this species includes San Diego, Imperial, and Riverside counties; portions of Arizona; Baja California; and Sonora, Mexico. This species has been reported from isolated desert locales in Joshua Tree National Monument, the Eagle Mountains, and Chuckwalla Mountains (Reiser 1994). There are approximately 27 occurrences primarily from the Chocolate Mountains area (BLM CCD 2002). The nearest CNDDB record is from McCoy Springs in the McCoy Mountains in 1976 from approximately 2,800 feet elevation (CNDDB 2010); however, its occurrence in the McCoy Mountains was recently confirmed during surveys for the Blythe Solar Power Project (Solar Millennium 2009b). This species typically blooms from April through June.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 12 new occurrences that were not in the CNDDB. Of these eight are historical records from between 1930 and 1966; however four of these are more recent occurrences found in the Sonoran (Colorado) Desert. Of the total 36 records in California (CNDDB plus new additional occurrences), six of these are protected under

Park Service, State Park, or BLM DWMA land ownership. A total of 11 records are historical records. None of these occurrences have documented threats.

One Las Animas colubrina plant was found in the buffer area one mile north of the plant site Disturbance Area (closer to the southern flank of the Palen Mountains) during 2009 field surveys; no additional plants were detected during the spring 2010 surveys. This species is associated with rockier, steeper headwater reaches and not likely to be found in the Project Disturbance Area.

Atriplex sp. nov

A potentially new taxon of saltbush (*Atriplex*) was discovered on the saline playa margins of Palen Dry Lake last year by a botanist with the U.C. Reserve System (Andre and La Doux, pers. comm.). Although it resembles the common four-wing saltbush (*Atriplex canescens*)—a common plant of dunes which has very linear leaves—the new taxon has obovate leaves that distinquish it from all *Atriplex canescens* and its subspecies. Although plasticity in fruit and vegetative characters hinders description and identification, many of the subspecies have been demonstrated to differ in ploidy level and chemical constituents and thus their biological validities are confirmed, including *Atriplex canescsens* ssp. *linearis* (Sanderson & Stutz 1994).

The undescribed *Atriplex* was first collected in 2005 at the "dry lake" just northeast of the Interstate 15 and Highway 95 junction approx 35 miles east and northeast of Las Vegas, Nevada. The first voucher/observation of it in California was at Palen Lake 2009. There is also potential for it to occur along the I-8 corridor in Imperial County. Although it is distinct from the common *Atriplex canescens* in its obovate leaves, it would be easy to overlook the new taxon where they co-occur, even by experienced botanists. The new taxon is more confined to subsaline/saline playa margins, though not necessarily so. Andre (pers. comm.) indicated that it may also have been observed in the Ford Dry Lake area (unconfirmed) and it has been observed in other saline (but non-playa) habitats on remnants of the lower Colorado River flood plain.

Flat-seeded Spurge

Flat-seeded spurge is a CNPS List 1B.2 species meaning it is rare, threatened, or endangered in California and elsewhere; fairly endangered in California. It is a BLM Sensitive species and CNDDB state rank S1.2. This species occurs in desert dunes and Sonoran desert scrub habitat types, in sandy places or shifting dunes, at elevations from approximately 200 to 300 feet. Some experts speculate that the species may be a “waif” in California, or a species that is not naturalizing, and note that it is more common in Arizona and Mexico (CNDDB 2010) but overall little is known or can be concluded (LaDoux pers comm). This ephemeral summer annual blooms February through September (CNPS 2009). There are four CNDDB records of this species for the entire state of California, only one of which is from Riverside County; the closest CNDDB occurrences is a historical record mapped near the City of Thousand Palms during 1926 (CNDDB 2010).

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 1 new occurrence that were not in the CNDDB. This occurrence is a historical record from 1933. Of the total five occurrences in California (CNDDB plus new

additional occurrences), one of these are protected under State Park ownership. A total of three records are historical records. None of these occurrences have documented threats.

This species was not observed during spring 2009 or spring 2010 (TTEC 2010m) surveys; however, the surveys were not timed to detect this species. Although there are no documented nearby occurrences, the Project occurs within its range, suitable habitat is present, and—as an ephemeral summer annual—it may be under-surveyed; its potential to occur cannot be dismissed (LaDoux pers. comm.).

Glandular Ditaxis

This is a CNPS List 2.2 species meaning that is it rare, threatened, or endangered in California, but more common elsewhere, fairly endangered in California. It is a CNDDB state rank S1/S2. This plant species grows from sea level to approximately 1,400 feet in Mojavean and Sonoran desert scrub habitat, in the sandy soils of dry washes and rocky hillsides. Glandular ditaxis (an annual or short-lived perennial) blooms from October through March (CNPS 2009); while it can be detected during spring surveys; it is easier to detect in fall following the start of the rainy season (Silverman pers. comm.).

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 3 new occurrences that were not in the CNDDB. All of these are historical records from 1932. Of the total 21 occurrences (CNDDB plus new additional occurrences), one of these is protected on under CDFG land ownership. A total of six records are historical occurrences. One of these has documented threats, including land development, and is likely extirpated.

This species was not observed during spring 2009 field surveys; nor was it detected during the spring 2010 surveys (TTEC 2010m).

California Ditaxis

California ditaxis is a CNPS List 3.2 species (a review list), meaning that its taxonomic status is questionable and more information is needed; however, its occurrences in California are fairly endangered (CNPS 2009). It is a NatureServe (CNDDB) state rank S2.2. This species occupies Sonoran desert scrub habitat, and prefers sandy washes and alluvial fans of the foothills and lower desert slopes, from 100 to 3,000 feet above MSL. Reports of this species are known from San Bernardino, Riverside, Imperial, San Diego, and Sonora, Mexico (CNPS 2009). There are 17 records from the CNDDB (2010) primarily from Riverside.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected four new occurrences that were not in the CNDDB. Three of these are historical records from between 1921 and 1952; however, one more recent occurrence was found at Anza-Borrego Desert State Park near Starfish Cove Canyon. Of the total 21 occurrences in California (CNDDB plus new additional occurrences), two of these are protected under Park Service ownership. A total of four records are historical records. Five of these occurrences have documented threats, including, OHV, road grading, and construction of a new power line.

This species was not observed during spring 2009 field surveys and based on preliminary survey results from spring 2010 this species was also not observed within the previously unsurveyed areas (TTEC 2010m).

Lobed Ground Cherry

Lobed ground cherry is a CNPS List 2.3 species, meaning that is rare, threatened, or endangered in California, but more common elsewhere; not very endangered in California. It is a CNDDB state rank S1.3. This species occurs in Mojavean desert scrub on decomposed granite soils, playas, and alkaline dry lake beds. This species occurs from approximately 1,500 feet to 2,400 feet. There are six records from the Consortium of California Herbaria database, all from San Bernardino County (CCH 2010).

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected two new occurrences that were not in the CNDDB. Both of these are more recent occurrences, including one from Joshua Tree National Monument and one in the eastern Mojave Desert. Of the total six occurrences in California (CNDDB plus new additional occurrences), none of these are protected under Park Service or other agency land ownership. None of these are historical records. None of these occurrences have documented threats.

This species was not observed during spring 2009 field surveys and based on preliminary survey results from spring 2010 this species was also not observed within the study area (TTEC 2010m).

Dwarf Germander

Dwarf germander is a CNPS 2.2 meaning that is it rare, threatened, or endangered in California, but more common elsewhere, fairly endangered in California. It is a CNDDB state rank 2. This species occurs in desert dune, playa margins, and Sonoran desert scrub habitats from approximately 100 feet to 1,200 feet. This species typically blooms from March to May but may also bloom from September through November. This species typically occurs in sandy soils and wash habitats and is known from fewer than 10 occurrences in California (CNPS 2009).

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 2 new occurrences that were not in the CNDDB. Both of these are historic records from 1905 and 1949. Of the total seven occurrences in California (CNDDB plus new additional occurrences), 1 is protected under the BLM DWMA land ownership. A total of three records are historical records. None of these occurrences have documented threats.

This species was not observed during spring 2009 field surveys and based on preliminary survey results from spring 2010 this species was also not observed within the previously unsurveyed areas (TTEC 2010m).

Palmer's jackass clover

Palmer's jackass clover is a proposed new addition to the CNPS inventory and is likely to be added to CNPS List 2 by the end of 2010 (California Energy Commission, 2010, in draft). Palmer's jackass clover is a perennial herb that occupies sandy washes, and

Sonoran desert scrub habitat from sea level to 650 feet. There are no CNDDB records for this species (CNDDB 2010).

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected seven occurrences that were not in the CNDDB. Four of these are historical records from between 1937 and 1952; however, two more recent occurrences were found in the Chocolate-Chuckwalla Mountains region, one southeast of Palen Dry Lake and one near the Palen Sand Dunes. No information on land ownership or documents of threats is available from the Consortium of California Herbaria.

This species was not observed during spring 2009 field surveys and based on preliminary survey results from spring 2010 this species was also not observed within the previously unsurveyed areas (TTEC 2010m).

Jackass-clover

This is a CNPS List 2.2 Species: rare, threatened, or endangered in California, but more common elsewhere, fairly endangered in California. It is CNDDB state rank 1.2. Jackass-clover inhabits desert dunes Mojavean desert scrub, playas, or Sonoran desert scrub. This species is commonly associated with sandy washes, roadsides, or alkaline flats, of elevations from 425 to 2,630 feet.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 2 new occurrences that were not in the CNDDB. One of these occurrences is a historical record from 1937; however one more recent occurrence was found at the Junction I-5 and Stockdale Highway west of Bakersfield. Of the total 9 occurrences in California (CNDDB plus new additional occurrences), three of these are protected under Park Service ownership. A total of three records are historical records. One of these occurrences has documented threats, including development.

This species was not observed during spring 2009 field surveys and based on preliminary survey results from spring 2010 this species was also not observed within the study area (TTEC 2010m).

Utah vining milkweed

This twining perennial occurs in sandy or gravelly soils in Mojavean and Sonoran desert scrub habitats or washes from approximately 500 feet to 4,300 feet in elevation (CNPS 2009). The distribution of this species covers San Diego, Imperial, Riverside, and San Bernardino counties and portions of Arizona, Nevada, and Utah. Until recently discovered growing on the Palo Verde Mesa (AECOM 2010d), it was believed that the Project was outside of the range of Utah vining milkweed. This species was not observed during spring 2009 field surveys. It was originally thought to be present onsite, but this was due to a mis-identification (GSEP 2009f). As a CNPS List 4, it is not tracked in CNDDB but there are 58 records of this species from the Consortium of California Herbaria database primarily from San Bernardino and San Diego counties; there is one record from the Big Maria Mountains from wash and stabilized dune habitat at approximately 1,200 feet elevation (CCH 2010).

Winged cryptantha

This is a spring-blooming annual that occurs in Mojavean and Sonoran desert scrub habitats from 300 feet to approximately 5,000 feet above mean sea level. This species blooms from March through April (CNPS 2009). Winged cryptantha is found in Mojavean and Sonoran deserts within California, Arizona, and Nevada. There are 79 records of this species in the Consortium of California Herbaria database from Riverside, Imperial, San Bernardino, and San Diego counties (CCH 2010). This species has low to moderate potential to occur at the Project site. There are no CNDDB records for this species for the entire state of California (CNDDB 2010). This species was not observed during spring 2009 field surveys, but one occurrence was detected north of the proposed substation (TTEC 2010o).

Special-status Wildlife Species

Desert Tortoise

The desert tortoise was state-listed in California as threatened on August 3, 1989. The Mojave population was federally listed as threatened on April 2 1990, and critical habitat was designated on February 8, 1994. The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, and southwestern Utah, and in the Sonoran (Colorado) Desert in California (USFWS 1990; USFWS 1994a). The desert tortoise's range, outside the listed Mojave population, extends into the Sonoran Desert, where tortoises occur in the lower Colorado River Valley, Arizona uplands, plains of Sonora, and the central Gulf Coast; the species has not been documented in northeastern Baja California (Germano et al. 1994).

Desert tortoises are well adapted to living in a highly variable and often harsh desert environment. They spend much of their lives in burrows, even during their seasons of activity, which generally coincides with the greatest annual forage availability. In late winter or early spring, they emerge from over-wintering burrows and typically remain active through fall. Activity does decrease in summer, but tortoises often emerge after summer rain storms to drink (Henen *et al.* 1998). During activity periods, desert tortoises eat a wide variety of herbaceous vegetation, particularly grasses and the flowers of annual plants (Berry 1974; Luckenbach 1982; Esque 1994). During periods of inactivity, they reduce their metabolism and water loss and consume very little food. Adult desert tortoises lose water at such a slow rate that they can survive for more than a year without access to free water of any kind and can apparently tolerate large imbalances in their water and energy budgets (Nagy and Medica 1986; Peterson 1996a, b; Henen et al. 1998).

The size of desert tortoise home ranges varies with respect to location and year (Berry 1986a) and also serves as an indicator of resource availability and opportunity for reproduction and social interactions (O'Connor *et al.* 1994). Females have long-term home ranges that may be as little or less than half that of the average male, which can range to up to 200 acres (Burge 1977; Berry 1986a; Duda et al. 1999; Harless et al. 2009). Core areas used within tortoises' larger home ranges depend on the number of burrows used within those areas (Harless et al. 2009). Over its lifetime, each desert tortoise may use more than 1.5 square miles of habitat and may make periodic forays of more than 7 miles at a time (Berry 1986a).

Tortoises are long-lived and grow slowly, requiring 13 to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential (Turner et al. 1984b; Bury 1987; Germano 1994). Mating occurs both during spring and fall (Black 1976; Rostal et al. 1994), and the number of eggs as well as the number of clutches (set of eggs laid at a single time) that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Turner et al. 1986, 1987; Henen 1997; McLuckie and Fridell 2002). Egg-laying occurs primarily from April to July (Rostal et al. 1994; USFWS 1994); the female typically lays 2-14 eggs (average 5-6) eggs in an earthen chamber excavated near the mouth of a burrow or under a bush (Woodbury and Hardy 1948; USFWS 1994). The eggs typically hatch 90 to 120 days later, between August and October. The success rate of clutches has proven difficult to measure, but predation, while highly variable (Bjurlin and Bissonette 2004), appears to play an important role in clutch failure (Germano 1994).

The majority of threats to the desert tortoise and its habitat are associated with human land uses. Many of those identified in the 1994 Recovery Plan, and that formed the basis for listing the species as threatened, continue to affect the tortoise today (USFWS 2008a). Some of the threats identified at the time of listing include urbanization, upper respiratory tract disease and possibly other diseases, predation by common ravens and domestic and feral dogs, unauthorized off-road vehicle activity, authorized vehicular activity, illegal collecting, mortality on paved roads, vandalism, drought, livestock grazing, feral burros, non-native plants, changes to natural fire regimes, and environmental contaminants (USFWS 1994).

Even though a wide range of threats are known to affect desert tortoises and their habitat, very little is known about their demographic impacts on tortoise populations or the relative contributions each threat makes to tortoise mortality (Boarman 2002a). Extensive research shows that all of these threats can directly kill or indirectly affect tortoises; research has also clarified many mechanisms by which these threats act on individuals. While current research results can lead to predictions about how local tortoise abundance should be affected by the presence of threats, quantitative estimates of the magnitude of these threats, or of their relative importance, have not yet been developed. Thus, the revised recovery plan focuses on expanding the knowledge of individual threats and places emphasis on understanding their multiple and combined effects on tortoise populations (USFWS 2008a).

The original *Desert Tortoise (Mojave Population) Recovery Plan* identified 6 recovery units (Upper Virgin River, Northeastern Mojave, Eastern Mojave, Eastern Colorado, Northern Colorado, and Western Mojave) and recommended the establishment of 14 DWMAs throughout the recovery units (USFWS 1994). Since 1994, greater insight into patterns of both ecological and genetic variation within the Mojave desert tortoise population has been gained. While the revised recovery plan has not yet been finalized, based on this new information, the revision redefines the recovery units to balance both distinctiveness and variability within the population. Given the generally continuous variation in genetic structure and biomes across the Mojave desert tortoise's range, the approach in delineating revised recovery units stresses identification of geographic discontinuities or barriers that coincide with any observed variation among tortoise populations. Several potential barriers are evident from topographic maps, the U.S.

Geological Survey habitat model (Nussear et al. 2009), and landscape genetic analyses (Hagerty 2008). Differences in genetic, ecological, and physiological characteristics to help highlight boundaries or other differences between units were used in the delineation. In doing this, the USFWS considered demographic, ecological, and behavioral considerations to be of greater importance than genetic issues alone, as have been suggested by researchers providing recommendations on the formulation of conservation plans for threatened or endangered species (Avise 2004; Mace and Purvis 2008). The draft revised recovery plan reduces the number of recovery units from six to five, which reflects the newly obtained information and ensures that local adaptations and critical genetic diversity are maintained (USFWS 2008a).

According to the 1994 Recovery Plan, the Project is located within Eastern Colorado Recovery Unit, which was merged with the Northern Colorado Recovery Unit in the draft revised recovery plan and referred to simply as the Colorado Desert Recovery Unit (USFWS 2008a). Within this recovery unit desert tortoise are found primarily in "well-developed washes, desert pavements, piedmonts, and rocky slopes characterized by relatively species-rich succulent scrub, creosote bush scrub, and blue palo verde-ironwood-smoke tree communities" (USFWS 1994). Habitat within this recovery unit has been described as being in excellent condition despite declines in tortoise densities over the past several decades; disturbance was estimated at less than 1.3 percent throughout (USFWS 2005). The highest desert tortoise densities within this recovery unit occur in Chemehuevi and Ward valleys, on the Chuckwalla Bench within the Chuckwalla Desert Wildlife Management Area (DWMA and associated Critical Habitat Unit) and in Joshua Tree National Park. Desert tortoise densities at the Chuckwalla Bench in 1992 were estimated between 22 and 49 adults per square kilometer (approximately 57–127 adults per square mile) but have shown declining trends (Berry 1997; Tracey et al. 2004).

According to the 1994 Recovery Plan, tortoise densities in the Eastern Colorado Recovery Unit were estimated between 5 and 175 adult tortoises per square mile and the area was given a threat level of 4 out of 5 (5 = extremely high) (USFWS 1994). Density estimates based on range-wide line distance sampling monitoring from 2001–2005 (USFWS 2006) are lower than estimates from earlier studies (Luckenbach 1982; Berry 1984), but these simple comparisons cannot be taken at face value when the historical monitoring efforts were conducted using different techniques at different scales and with different goals. Differences may reflect a difference in scale between methods, with relatively large historical tortoise densities estimated in small, local areas being smoothed over larger areas with range-wide sampling. However, low tortoise densities across recovery units from 2001-2005 may also represent continued decline of populations throughout the Mojave Desert since the species was listed (USFWS 2006).

Protocol-level surveys of most of the Study area were conducted between March 17 – 25 and April 6 – 13, 2009 (Study area except south of I-10) and October 30, 2009 (transmission line south of I-10). The transmission line route changed after spring surveys; the northern alignment was included in spring surveys, but not to the same level of intensity as the rest of the Study area, and further surveys are scheduled for Spring 2010 (TTEC 2010a). Survey results of the Project Disturbance Area include 19 mineralized and 9 non-mineralized carcass fragments. Preliminary spring 2010 surveys

identified approximately 30 tortoise bone fragments (>> 4 years age) along the transmission line and buffer area (TTEC 2010m).

The Applicant indicates that the Project Disturbance Area is currently unoccupied by desert tortoise. They conclude that the northwestern portion of the Project site is suitable or marginally suitable habitat, while the remainder of the site is not habitat for desert tortoise. They also conclude that the Sonoran creosote bush scrub and wash habitat north and west of the Project site is higher quality habitat (GSEP 2009a, TTEC 2009c). Energy Commission, BLM, CDFG and USFWS staff agree that the habitat within the Project Disturbance Area is of lower quality closer to the Ford playa and is higher quality toward the upper bajadas, but consider the entire Project site to contain suitable habitat for desert tortoise (e.g., Sonoran creosote bush scrub with friable soils for burrowing and appropriate forage plants) and could potentially be occupied by this species in the future.

Mojave Fringe-toed Lizard

The Mojave fringe-toed lizard is endemic to southern California and a small area of western Arizona, where it is restricted to aeolian (wind-blown) sand habitats in the deserts of Los Angeles, Riverside, and San Bernardino Counties in California and La Paz County in Arizona (Hollingsworth and Beaman 1999; Stebbins 1985). Nearly all records for this species are associated with present-day and historical drainages and associated sand dune complexes of the Mojave and Amargosa Rivers (Norris 1958).

The distribution of Mojave fringe-toed lizards is naturally fragmented because of its obligate habitat specificity to loose sand, a patchy habitat type (Murphy et al. 2007). Many local populations of this species are quite small, with small patches of sand supporting small populations of lizards. This fragmented pattern of distribution leaves the species vulnerable to local extirpations from additional habitat disturbance and fragmentation (Murphy et al. 2007). The loose wind-blown sand habitat, upon which the species is dependent, is a fragile ecosystem requiring the protection against both direct and indirect disturbances (Weaver 1981; Barrows 1996). Environmental changes that stabilize sand, affect sand sources, or block sand movement corridors will also affect this species (Turner et al. 1984; Jennings and Hayes 1994). Additional threats to this species include habitat loss or damage from urban development, off-highway vehicles (OHV), and agriculture. Aside from the direct loss of land, development can also increase predators, such as the common raven, to occupied habitat.

Murphy et al. (2006) identified two maternal lineages of this species; the northern lineage is associated with the Amargosa River drainage system, and the southern with the Mojave River drainage system, Bristol Trough, Clark’s Pass (including Palen Lake and Pinto Wash), and the Colorado River sand transport systems.

The Mojave fringe-toed lizard is found in arid, sandy, sparsely vegetated habitats and isassociated with creosote bush scrub throughout much of its range (Norris 1958; Jennings and Hayes 1994). This species is totally restricted to habitats of fine, loose, aeolian sand, typically with sand grain size no coarser than 0.375 mm in diameter (Turner et al. 1984; Jennings and Hayes 1994; Stebbins 1944). It burrows in the sand for both cover from predators and protection from undesirable temperatures (Stebbins 1944), though it will also seek shelter in rodent burrows. They are primarily

insectivorous, but also eat plant food including leaves, seeds, and buds (Stebbins 1944). Mojave fringe-toed lizards normally hibernate from November to February, emerging from hibernation sites from March to April. The breeding season is April to July, and adult Mojave fringe-toed lizards reach sexual maturity two summers after hatching. Females deposit 2-5 eggs in sandy hills or hummocks May through July (Mayhew 1964, Jennings and Hayes 1994). April to May, while temperatures are relatively cool, this species is active during mid-day; from May to September, they are active in mornings and late afternoon, but seek cover during the hottest parts of the day. Common predators of the Mojave fringe-toed lizard include burrowing owls, leopard lizards, badgers, loggerhead shrikes, roadrunners, various snakes, and coyotes (Jennings and Hayes 1994).

Thirty-nine Mojave fringe-toed lizards were observed during spring 2009 Project surveys. Approximately 60+ Mojave fringe-toed lizards including juvenile, subadult, and adults were found during spring 2010 field surveys within the transmission line and buffer area (TTEC 2010m). Several Mojave fringe-toed lizards were observed within the proposed six-pole extension area for the gen-tie transmission line at the SCE Colorado River Substation site. The Project Disturbance Area contains suitable Mojave fringe-toed lizard habitat wherever stabilized and partially stabilized sand dune habitat (1 acres) and playa/sand drift over playa habitat (37 acres) occur. Mojave fringe-toed lizard habitat preferences are more closely tied to the landform than to the vegetation community, and Sonoran creosote bush scrub habitat with an active sand layer can also support this species. This species was detected south of I-10 in Sonoran creosote bush scrub because this area supports a layer of wind-blown sand from the adjacent dunes.

Couch's Spadefoot Toad

Couch's spadefoot toad is found in southeastern California east through Arizona, New Mexico, Texas, and Oklahoma, south to San Luis Potosi, Nayarit, Mexico, at the southern tip of Baja California, Mexico, and an isolated population in Colorado. In California, it is found in the extreme southeast, including southeastern San Bernardino County and eastern Riverside and Imperial Counties (Jennings and Hayes 1994). The Project area is west of the range for this species as the range is described in the Northern & Eastern Colorado Desert Coordinated Management Plan (BLM CDD 2002) and Amphibian and Reptile Species of Special Concern in California (Jennings and Hayes 1994); however, Dimmitt (1977) identifies the Palen Dry Lake area as a place of interest for further surveys.

They are found in a variety of plant communities, including desert dry wash woodland, creosote bush scrub, and alkali sink scrub. They require habitat with substrate capable of sustaining temporary pools for breeding, and loose enough to permit burial in subterranean burrows (Jennings and Hayes 1994, BLM CDD 2002). Breeding habitat includes temporary impoundments at the base of dunes as well as road or railroad embankments, temporary pools in washes or channels, pools that form at the downstream end of culverts, and playas (Morey 2005; Morey, pers. comm.; Mayhew 1965). Natural scour sites in washes with breeding toads (included in Dimmitt 1977) had washed down to a hardpan, which enabled ponding (Dimmitt, pers. comm.). The majority of known Couch's spadefoot toad breeding ponds are artificial, though this may be because of the difficulty of locating natural ponds within the limited amount of time

ponds may retain water. Couch's spadefoot toads require a food source, primarily alate termites, but they also eat beetles, ants, grasshoppers, solpugids, scorpions, and centipedes.

This species is dormant from 8-10 months of the year, emerging from burrows at the onset of warm summer rains. Emergence appears to be triggered by the low frequency sound caused by falling rain, though it appears to be inhibited by low soil temperatures.

Threats to Couch's spadefoot include loss of habitat from urbanization and agriculture and impacts from off-highway vehicles, which can destroy potential pool habitat. There are also indications that the low-frequency sound created by off-highway vehicles may trigger emergence cues, and result in emergence in poor environmental conditions (Jennings and Hayes 1994). Emergence may also be triggered by construction vehicle noise (Dimmitt, pers. com.).

No Couch's spadefoot toads were observed during surveys; however, because of the short time this species is above ground, and because the surveys were not conducted during the proper season (i.e., after summer rains), the lack of observations does not suggest the species is absent from the Project site. During Project surveys, the Applicant searched for artificial or temporary water catchments that could serve as breeding pools (GSEP 2009a). None were identified within the Study area. Staff reviewed Project site aerials, however, and has identified some areas that appear to sustain or that could potentially sustain surface water.

The closest known record for this species is from Dimmitt (1977) from a breeding pond near the intersection of I-10 and Wiley Well Road. While Dimmitt (1977) does not identify the exact location of this pond, a large ponded area (an old borrow pit) is visible in aerial photos in the same general area identified by Dimmit (1977). Aerial photos and a site visit by BLM staff indicate the borrow pit can sustain ponded water. This area is within the Project transmission line route.

Western Burrowing Owl

The western burrowing owl inhabits arid lands throughout much of the western United States and southern interior of western Canada (Haug et al. 1993) and is typically a year-round resident in much of California (Gervais et al. 2008).

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by California ground squirrels, kit fox, desert tortoise, and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering habitats. They often return to burrows used in previous years, especially if they were successful at reproducing there in previous years (Gervais et al. 2008). The southern California breeding season (defined as from pair bonding to fledging) generally occurs from February to August with peak breeding activity from April through July (Haug et al. 1993).

In the Colorado Desert, western burrowing owls generally occur at low densities in scattered populations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant, including along the lower Colorado River (Gervais et al. 2008). Western burrowing owls tend to be opportunistic

feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet. Small mammals, especially mice and voles (*Microtus, Peromyscus,* and *Mus* spp.), are also important food items for this species. Other prey animals include

reptiles and amphibians, young cottontail rabbits, bats, and birds, such as sparrows and horned larks. Consumption of insects increases during the breeding season (Haug et al. 1993).

Threats to burrowing owls include habitat modification and destruction of ground squirrel burrows. Other threats include pesticide accumulation, burrow destruction from farming practices and canal and road maintenance, roadside shooting, and direct mortality from squirrel poisons (BLM CDD 2002; Gervais et al. 2008).

Protocol-level surveys of part of the Project Disturbance Area (except for part of the Study area associated with the newest transmission line route south of I-10) were conducted in winter of 2007 (Phase I) and spring of 2009 (GSEP 2009a). One burrowing owl was observed during 2007 surveys and two owls and burrowing owl sign (burrows, whitewash, feathers and pellets) were observed throughout the study area during 2009 field surveys although outside of the Project Disturbance Area. One burrowing owl was observed during spring 2010 field surveys within the transmission line study area (TTEC 2010m). The entire Project Disturbance Area (1,811acres) is considered burrowing owl habitat.

Golden Eagle

Golden eagles are typically year-round residents throughout most of their western United States range. They breed from late January through August with peak activity March through July (Kochert et al. 2002). Migratory patterns are usually fairly local in California where adults are relatively sedentary, but dispersing juveniles sometimes migrate south in the fall. This species is generally considered to be more common in southern California than in the northern part of the state (USFS 2008).

Habitats for this species typically include rolling foothills, mountain areas, and deserts. Golden eagles need open terrain for hunting and prefer grasslands, deserts, savanna, and early successional stages of forest and shrub habitats. Golden eagles primarily prey on lagomorphs and rodents but will also take other mammals, birds, reptiles, and some carrion (Kochert et al. 2002). This species prefers to nest in rugged, open habitats with canyons and escarpments, with overhanging ledges and cliffs and large trees used as cover.

The status of golden eagle populations in the United States is not well known, though there are indications populations may be in decline (USFWS 2009b, Kochert et al. 2002). Accidental death from collision with man-made structures, electrocution, gunshot, and poisoning are the leading causes of mortality for this species, and loss and degradation of habitat from agriculture, development, and wildfire continues to put pressure on golden eagle populations (Kochert et al. 2002; USFWS 2009b).

Absent interference from humans, golden eagle breeding density is determined by either prey density or nest site availability, depending upon which is more limiting (USFWS 2009b). A compilation in Kochert et al. (2002) of breeding season home ranges from several western United States studies showed an average home range of 20 to 33 square kilometers (7.7 to 12.7 square miles) that ranged from 1.9 to 83.3 square kilometers (0.7 to 32.2 square miles). In San Diego, a study of 27 nesting pairs

found breeding ranges to be an average of 36 square miles with a range from 19 to 59 square miles (Dixon 1937). Other studies from within and outside the United States include ranges from 9 to 74.2 square miles (McGahan 1968; Watson et al. 1992 [range of 14.7 to 26.1 pairs per 1,000 square kilometers]). An Environmental Assessment (EA) and Implementation Guidance for take permits was issued under the Bald Eagle and Golden Eagle Protection Act (USFWS 2009b). The EA specifies that in implementing the resource recovery permit for take of inactive golden eagle nests (50 CFR 22.25), data within a 10-mile radius of the nest provides adequate information to evaluate potential effects. In Spring 2010, the Applicant along with applicants of other adjacent proposed solar development projects jointly funded golden eagle helicopter surveys, following the during spring 2010 following the USFWS's February 2010 *Interim Golden Eagle Inventory and Monitoring Protocols* (Pagel et al. 2010); however to-date, the results of the surveys are not available. The closest known historic golden eagle nests are within 14 miles of the Project site (BLM 1999). No recent survey information is available indicating whether these nests are currently active or have recently been used. Nearby Palen and McCoy mountains may also provide suitable nesting habitat. No golden eagles were observed during surveys in the Study area, including during avian point count surveys. The avian point count surveys were conducted in March and April, 2009 (GSEP 2009a). However, these surveys were conducted within the Project site only and therefore were not designed to survey potential golden eagle nesting habitat near the Project site, and did not assess the quality of foraging habitat or prey abundance for eagles.

Loggerhead Shrike

Loggerhead shrikes are uncommon residents throughout most of the southern portion of their range, including southern California. In southern California they are generally much more common in interior desert regions than along the coast (Humple 2008). Loggerhead shrikes initiate their breeding season in February and may continue with raising a second brood as late as July; they often re-nest if their first nest fails or to raise a second brood (Yosef 1996).

This species can be found within lowland, open habitat types, including creosote bush scrub and other desert habitats, sage scrub, non-native grasslands, chaparral, riparian, croplands, and areas characterized by open scattered trees and shrubs. Fences, posts, or other potential perches are typically present. In general, loggerhead shrikes prey upon large insects, small birds, amphibians, reptiles, and small rodents over open ground within areas of short vegetation, usually impaling prey on thorns, wire barbs, or sharp twigs to cache for later feeding (Yosef 1996). Loss of habitat to agriculture, development, and invasive species is a major threat; this species has shown a significant decline in the Sonoran Desert (Humple 2008).

Loggerhead shrikes were observed throughout the survey area during spring 2009 and preliminary spring 2010 field surveys (TTEC 2010m) as well as during avian point count surveys. The entire Project site is considered loggerhead shrike habitat (GSEP 2009a).

Le Conte's Thrasher

In California, Le Conte's thrasher is a resident in the San Joaquin Valley and the Mojave and Colorado deserts. It occurs in desert flats, washes and alluvial fans with sandy

and/or alkaline soil and scattered shrubs. It rarely occurs in monotypic creosote bush scrub habitat, because creosote bush is unable to support a nest, or in massive Sonoran Desert woodlands (Prescott 2005). Preferred nest substrate includes thorny shrubs and small desert trees. Breeding activity occurs from January to early June, with a peak from mid-March to mid-April (BLM CDD 2002). Le Conte's thrashers forage for food by digging and probing in the soil. They eat arthropods, small lizards and snakes, and seeds and fruit; the bulk of their diet consists of beetles, caterpillars, scorpions, and spiders.

This species was observed during Project surveys. Although the entire project area may provide suitable habitat for this species, the best habitat is likely the microphyll woodland associated with the linear facilities.

Crissal thrasher

Crissal thrashers are non-migratory residents ranging from southern Nevada and southeastern California to western Texas and central Mexico. This species prefers habitats characterized by dense, low scrubby vegetation, which, at lower elevations, includes desert and foothill scrub and riparian brush. Nests of this species typically consist of an open cup of twigs, lined with finer vegetation, and are placed in the middle of a dense shrub (Shuford & Gardali 2008).

Based on a review of the vegetation community descriptions provided by the Applicant, the Project site contains little, if any, of the dense scrub habitat preferred by this species. They are known from the area, including from McCoy Spring, Palen Valley, and Chuckwalla Well (Shuford & Gardali 2008). The closet occurrence based on the CNDDB (2010) is south of the Project site within one mile of the transmission line interconnection location.

California Horned Lark

The California horned lark is found throughout California except the north coast, and is less common in mountainous areas. This species prefers open areas that are barren or with short vegetation including deserts, brushy flats, and agricultural areas. Eggs are laid March to early June, and this species frequently lays a second clutch.

The Project site contains suitable habitat for this species, especially in creosote bush scrub. This species was observed frequently in the Project Disturbance Area during surveys, and was the most numerous species observed during avian point count surveys (GSEP 2009a).

Brewer's Sparrow

In California, Brewer's sparrow is a common breeding bird east of the Cascade-Sierra Nevada crest, in the mountains and higher valleys of the Mojave Desert, and, uncommonly, at high elevations in San Bernardino, Ventura, Kern, and San Luis Obispo counties. This species winters in the southeastern part of the state in sagebrush shrublands and brushy desert habitat, including desert scrub dominated by various saltbush species and creosote (Zeiner et al. 1990, Rotenberry et al. 1999).

Declines in this species have been noted in the breeding range, and may be attributable to loss and fragmentation of breeding habitat. Impacts due to degradation of wintering habitat have not been reported for this species (Rotenberry et al. 1999).

Brewer's sparrows were observed during Project surveys, and would be expected in the Project area as a winter resident.

Prairie Falcon

The prairie falcon inhabits dry environments in the North American west from southern Canada to central Mexico. It is found in open habitat from annual grasslands to alpine meadows at all elevations up to 3,350 m, but is associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. They require cliffs or bluffs for nesting though will sometimes nest in trees, on power line structures, on buildings, or inside caves or stone quarries. Ground squirrels and horned larks are the primary food source, but prairie falcon will also prey on lizards, other small birds, and small rodents.

One prairie falcon was observed (flyover) within the transmission line buffer area during spring 2010 surveys (TTEC 2010m). The entire Project Disturbance Area (1,811 acres) is suitable foraging habitat for prairie falcon, and this species was observed on the Project site. The Project site does not contain suitable nesting habitat, although adjacent mountains may. There are numerous CNDDB (2010) records in the region for this species, including nest records from Little Maria Mountains to the northeast (1977) and the Chuckwalla Mountains to the southwest (1978).

Short-eared Owl

Short-eared owls breed through much of northern North America, and are year-round residents in some areas of California. Historically, this species bred throughout much of California, west of the southern deserts, in low numbers. Currently, small populations breed regularly in the Great Basin and in the Sacramento/San Joaquin River Delta area, but sporadically in other parts of its former range. Short-eared owls require open country that supports small mammal populations, and that also provides adequate vegetation to provide cover for nests. This includes salt- and freshwater marshes, irrigated alfalfa or grain fields, and ungrazed grasslands and old pastures (Shuford & Gardali 2008, Zeiner et al. 1990).

The Project area is not within the breeding range for short-eared owl as the range is described in CDFG publications (Zeiner et al. 1990, updated 2008; Shuford & Gardali 2008); in addition, the Project site does not provide suitable breeding habitat. The Project site does contain suitable wintering habitat for the short-eared owl, and this species was observed during Project surveys.

Swainson's Hawk

Swainson's hawks require large areas of open landscape for foraging, including grasslands and agricultural lands that provide low-growing vegetation for hunting and high rodent prey populations. Swainson's hawks typically nest in large native trees such as valley oak, cottonwood, walnut, and willow, and occasionally in nonnative trees, such

as eucalyptus within riparian woodlands, roadside trees, trees along field borders, isolated trees, small groves, and on the edges of remnant oak woodlands (CDFG 1993).

While there are historical breeding records of this species from the Colorado Desert (Woodbridge 1998), this species is now known from southern California only as a spring and fall migrant (CDFG 1993). This reduction in breeding range is believed to be from loss of nesting habitat (Zeiner et al. 1990, updated 2006).

The Project site may provide foraging habitat for migrating individuals, and this species was observed in the Project site during spring 2009 and preliminary 2010 field surveys. Three individual Swainson's hawks (flyovers) were found during 2010 field surveys along the transmission line and buffer area (TTEC 2010m).

Ferruginous Hawk

Ferruginous hawks do not breed in California, but are winter residents and in California are most common in grassland and agricultural areas in the southwest. Ferruginous hawks are found in open terrain from grasslands to deserts, and are usually associated with concentrations of small mammals. Threats to this species include loss of wintering habitat from urbanization and cultivation.

The Project site contains suitable wintering habitat for ferruginous hawks, and this species was observed during spring 2009 and preliminary 2010 field surveys. One individual ferruginous hawk (flyover) was observed along the transmission line following spring 2010 surveys (TTEC 2010m).

Northern Harrier

In western North America, the northern harrier breeds from northern Alaska south to Baja California, Mexico. This species does not commonly breed in desert regions of California, where suitable habitat is limited, but winters broadly throughout California in areas with suitable habitat. Northern harriers forage in open habitats including deserts, pasturelands, grasslands, and old fields.

The Project site contains suitable wintering habitat for the northern harrier, and this species was observed during spring 2009 and 2010 field surveys (GSEP 2009a). One individual harrier was observed during 2010 field surveys (TTEC 2010m). There are CNDDB (2010) nesting records for this species in eastern Riverside County

American Badger

American badgers were once fairly widespread throughout open grassland habitats of California. Badgers are an uncommon permanent resident with a wide distribution across California, except from the North Coast area. American badger is most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas (Zeiner et al. 1990). Badgers inhabit burrows and often predate and forage on other small mammal burrows as evidenced by claw marks along the edges of existing burrows.

American badger sign was found during spring 2009 field surveys; burrow predation evidence by badgers was found in the buffer area west of the solar power plant Project Disturbance Area. Therefore, the entire Study area is considered suitable habitat for American badger.

Desert Kit Fox

Desert kit fox is an uncommon to rare permanent resident of arid regions of the southern portion of California. Kit fox occur in annual grasslands, or grassy open, arid stages of vegetation dominated by scattered herbaceous species. Kit fox occur in association with their prey base which is primarily cottontail rabbits, ground squirrels, kangaroo rats and various species of insects, lizards, or birds (Zeiner et al. 1990). California Code of Regulations 14 CCR § 460 stipulates that desert kit fox may not be taken at any time. Protection provided by kit fox dens for use as shelter, escape, cover, and reproduction is vital to the survival of the species.

Desert kit fox burrows, complexes and scat were observed throughout the Study area within desert wash and upland scrub habitats during 2009 field surveys; desert kit fox complexes, kit fox scat and burrows were observed south of I-10 during spring 2010 field surveys (TTEC 2010m). Over 65 kit fox burrow complexes, both active burrows with fresh scat present and inactive burrow complexes were observed throughout the solar power plant Project Disturbance Area and linear Disturbance Area (GSEP 2009a). The entire Study area is suitable habitat for desert kit fox.

Nelson's Bighorn Sheep

Nelson's bighorn sheep includes bighorns from the Transverse Ranges through most of the desert mountain ranges of California, Nevada, and northern Arizona to Utah. Essential habitat for bighorn sheep includes steep, rocky slopes of desert mountains, termed "escape terrain." Their agility on steep rocky terrain is an adaptation used to escape predators such as coyotes, eagles, and cougars (Wehausen 1992). Surface water is another element of desert bighorn habitat considered essential to population health. Male and female bighorn sheep inhabiting desert ecosystems can survive without consuming surface water (Krausman et al. 1985) and males appear to drink infrequently in many situations; however, there are no known large populations of bighorn sheep in the desert region that lack access to surface water. In the spring, when annual plants are available, bighorn tend to disperse downhill to bajadas and alluvial fans to forage. Desert bighorn have a long lambing season that can begin in December and end in June in the Mojave Desert, and a small percentage of births commonly occur in summer as well (Wehausen 1992).

Over the past 140 years, bighorn sheep have suffered considerable population declines throughout their range and metapopulations have been fragmented by roads and other barriers with a resulting decline in genetic diversity (Bleich et al. 1996, Epps et al. 2005). Disease, sometimes brought about by contacts with domestic sheep, drought and predation, interacting with other anthropogenic factors may also have contributed to declines in bighorn sheep populations (Wehausen 2005). Loss of surface water sources may also diminish the viability of existing populations (Wehausen 2005).

Two metapopulations of bighorn sheep occur within the NECO Planning Area, the Southern Mojave and Sonoran. Within these metapopulations, there are smaller, somewhat isolated subpopulations of bighorn sheep known as demes, with nine demes occuring in the Sonoran metapopulation (BLM CDD 2002). Bighorn sheep metapopulations have been fragmented by highways, roads, railroads, and aqueducts primarily by the construction of Interstate 10 and Interstate 40 which are major barriers to bighorn sheep movements. Transportation corridors of Highways 66, 62, 177, 95, and 78, the Atchison, Topeka &and Santa Fe Railroad (parallel to Old Highway 66) and the Eagle Mountain Railroad (scheduled for reactivation) inhibit bighorn sheep movements between demes. Nevertheless, bighorn sheep are known to cross these and other linear features such as transmission lines and fences.

The Project site is located southeast of an occupied bighorn Sheep WHMA in the Palen, Granite, and Coxcomb Mountains (BLM CDD 2002), and southwest of a currently unoccupied Bighorn Sheep WHMA in the McCoy Mountains. Recent surveys suggest bighorn sheep may occur in the Little Maria Mountains, farther northeast of the Project area, in an area designated by the NECO Plan as an unoccupied WHMA (Wehausen 2009). The CNDDB records for this species from the Project area indicate that bighorn sheep disperse through these mountain ranges typically whenever forage and water conditions permit.

No sign or evidence of Nelson's bighorn sheep were found during field surveys and bighorn sheep are not expected to occur in the Project area. The Project Area is not within a known bighorn sheep corridor as identified in the NECO Plan.

Burro Deer

Burro deer is a subspecies of mule deer (*Odocoileus hemionus*) found in the Colorado Desert of southern California. This species is found in the Colorado region of the Sonoran Desert near the Colorado River and within desert dry wash woodland communities. Some burro deer are resident along the Colorado River, but a significant portion move into desert areas in response to water and forage. During the hot summers, water is critical, and burro deer concentrate along the Colorado River or the Coachella Canal where water developments have been installed and where microphyll woodland is dense and provides good forage and cover. With late summer thundershowers and cooler temperatures, deer move away from the Colorado River and Coachella Canal and then up the larger washes into mountains or wash complexes in the foothills (BLM CDD 2002).

During spring 2009 field surveys, tracks of burro deer were found in one location south of I-10 along the southern transmission line route (GSEP 2009a, Appendix C). Burro deer sign (tracks) were found along the transmission line and buffer area during spring 2010 field surveys (TTEC 2010m). This species is expected to occur north of I-10 and within the Study area especially along desert washes and areas of dry desert wash woodland and other microphyllous riparian vegetated washes. Therefore, these habitat areas are considered suitable for burro deer within the Study area.

Biological Resources Table 4 lists all special-status species evaluated during the analysis that are not likely to occur or have a low to moderate potential for occurrence in the Project area. This table provides additional information on the species identified in

Biological Resources Table 3 and the determination of their potential for occurrence in the Project area such as the presence or absence of suitable habitat, nearby occurrence records, and survey efforts that have taken place.

Biological Resources Table 4
Special-Status Species with No, Low or Moderate Potential to Occur at the GSEP Study Area

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Plants		
Angel trumpets *Acleisanthes longiflora*	This species occurs in Sonoran desert scrub habitats on carbonate soils from approximately 200 to 300 feet above MSL. There are two records from the Consortium of California Herbaria from the Colorado Desert, Palo Verde area (CCH 2010).	This species has low potential to occur in the Project area due to the presence of suitable habitat although the site being located above the elevation range of this species. Surveys will be conducted for this species in 2010. This species is not expected to occur in the Project area because it is above the elevation range of this species.
Argus blazing star *Mentzelia puberula*	This plant species occurs in desert scrub and desert woodlands with limestone and granitic slopes above 2,000 feet in elevation. This is a species of hot, rugged, rocky areas and should be distinguishable from M. multiflora on habitat characteristics alone. Argus blazing star was a proposed addition and is now a recent addition to CNPS List 2, In California, this species has been observed in good numbers in the Whipple, Chemehuevi and Turtle mountains, in southeastern San Bernadino and eastern Riverside counties along the Colorado River (Silverman, Pers. Comm. March 2010). Based on 13 Consortium of California Herbaria database records for this species, this species has been collected from Riverside, San Bernardino, and Imperial counties from the Little and Big Maria Mountains in Riverside County.	This species has low potential to occur in the study area; limestone and granitic slopes which are soil types preferred by this species are absent from the study area. The Project site is located at approximately 360 to 450 feet above MSL which is well below the typical elevation where this species typically occurs. This will be a target species during 2010 focused botanical surveys.
Arizona spurge *Chamaesyce arizonica*	This species occupies sandy, Sonoran desert scrub habitat areas and has been reported from Imperial, Riverside, San Diego counties and portions of Arizona and Baja, California (CNPS 2009) from approximately 150 feet to 1,200 feet above MSL. There are 7 database records from the Consortium of California Herbaria primarily from San Diego County but also Riverside and Imperial counties often from sandy areas and transition areas between chaparral and desert habitats. The record from Riverside County is near Palm Springs from Andreas Canyon (CCH 2010).	This species has a low potential to occur within the study area. Although suitable habitat is present and the project site is within the appropriate elevation range, there are no CNDDB occurrences within 10 miles of the site and the species is not known to occur in the area.
Bitter hymenoxys	Bitter hymenoxys grows in riparian scrub and Sonoran	This species has low potential to occur within the

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Hymenoxys odorata	desert scrub habitats from 150 feet to 500 feet above MSL. This plant species blooms from February through November (CNPS 2009). There are five CNDDB records for this species for the entire state of California, two of which occur in Riverside County.	Sonoran creosote bush scrub habitats within the Project area. However, this species was not found during spring 2009 field surveys. There are no CNDDB occurrences within 10 miles of the site.
Bitter snakeweed *Condalia globosa* var. *pubescens*	Another common name for this species is spiny abrojo. Bitter snakeweed occurs in Sonoran desert scrub from approximately 400 feet to 3,000 feet above MSL. Bitter snakeweed blooms from March through May (CNPS 2009). Based on 35 records Consortium of California Herbaria database, all records are from Imperial County except one from Riverside County, a record from 1,900 feet elevation from a relatively flat alluvial fan from Chuckwalla Bench (CCH 2010). There are no CNDDB records for this species for the state of California (CNDDB 2010).	The higher elevation levels of the Project site are within the appropriate elevation range where this species typically occurs. However, this species was not observed during spring 2009 field surveys. There are no CNDDB occurrences within 10 miles of the site.
California ayenia *Ayenia compacta*	This species occurs in Mojavean and Sonoran desert scrub habitats from approximately 500 to 3,300 feet above MSL. This species blooms from March through April. There are 29 records from the Consortium of California Herbaria database from the Anza Borrego area alone, one from Riverside County from a sandy wash in the Santa Rosa Mountains off Martinez Canyon (CCH 2010).	This species was not observed during spring 2009 field surveys. This species not expected to occur since the elevation range of the Project site is not appropriate for this species.
California satintail *Imperata brevifolia*	This species occurs in grassy areas found near chaparral, desert scrub, riparian scrubs, coastal scrub, wet springs, meadows, stream sides and floodplains from sea level to approximately 1,500 feet above MSL. There are 64 records from the Consortium of California Herbaria database from many northern and southern California counties. Records from Riverside County are from the Palm Springs and San Jacinto Mountains area along irrigation ditches or streams.	This species has low potential to occur within the study area due to the presence of suitable habitat. However, this species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Chaparral sand verbena *Abronia villosa* var. *aurita*	This species occupies sandy soil areas of chaparral, coastal sage scrub, and sandy desert dune habitats (CNPS 2009) from approximately 240 feet to approximately 4,800 feet above MSL. There are 147 records in the Consortium of California Herbaria database many from Riverside County in the San Jacinto Mountains area.	This species has low potential to occur within the study area due to the presence of suitable habitat. However, this species was not observed during spring 2009 field surveys. There are no CNDDB occurrences within 10 miles of the site.
Coachella Valley milk-vetch	The Coachella Valley Multiple Species Habitat Conservation Plan states that this species occurs on	This species was not observed during spring 2009 surveys and does not have a potential to

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Astragalus lentiginosus var. *coachellae*	"dunes and sandy flats, along the disturbed margins of sandy washes, and in sandy soils along roadsides and in areas formerly occupied by undisturbed sand dunes. Within the sand dunes and sand fields, this milk-vetch tends to occur in the coarser sands at the margins of dunes, not in the most active blows and areas. As this species is strongly affiliated with sandy substrates, it may occur in localized pockets where sand has been deposited by wind or by active washes. It may also occur in sandy substrates in creosote bush scrub, not directly associated with sand dune habitat (CVAG 2007). This plant species blooms from February to May, producing pink to deep magenta-colored flowers. This species occurs on aeolian deposits with fewer than 25 occurrences in the Coachella Valley. Coachella Valley milk-vetch depends on natural disturbances from fluvial and aeolian processes for seedling establishment (BLM CDD 2002).	occur in the study area. The distribution of Coachella Valley milk-vetch is restricted to the Coachella Valley in Riverside County, between Cabazon and Indio. CVAG (2007) identifies six outlying occurrences within a 5-mile area along Rice Road in the Chuckwalla Valley north of Desert Center, California (CVAG 2007); however, USFWS staff has indicated that these occurrences are not of the listed taxon (Engelhard, personal communication).
Cove's cassia *Senna covesii*	This species occurs on dry, sandy desert washes and slopes, roadsides, alkaline flats in the Mojave Desert and northern Sonoran Desert between 1,600 to 2,000 feet above MSL (CNPS 2009).	This species is not expected to occur within the study area since the Project site is located below the typical elevation range where this species is known to occur. This species was not observed during spring 2009 field surveys.
Crucifixion thorn *Castela emoryi*	This species occurs in Sonoran Desert and Mojavean Desert in scrub habitats and playas with dry, gravelly washes, slopes, and plains from approximately 300 to 2,100 feet above MSL. There are 64 records in the Consortium of California Herbaria database from Riverside, San Bernardino and Imperial counties among others and often times prefers grassy or hayfield habitats. There is a record from a hayfield in Chuckwalla Valley.	This species has a low potential to occur within the study area due to the presence of suitable habitat and appropriate elevation range of the Project site. However, this species was not observed during spring 2009 field surveys. The nearest CNDDB record for this species is approximately 5 miles north of the Project site in the Palen Mountains.
Desert portulaca *Portulaca hamiloides*	This species occurs in Joshua tree woodlands and has been reported from Riverside, San Bernardino, and portions of Arizona and Baja, California from 3,000 feet to 3,600 feet above MSL (CNPS 2009).	Given the lack of typical habitat associations and the Project site being located outside of the elevation range, this species has low potential to occur within the study area. This species was not observed during spring 2009 field surveys, and will be a target species for the 2010 botanical surveys.
Desert sand parsley	This species occupies Sonoran creosote bush scrub habitat	This species has a low potential to occur within

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Ammoselinum giganteum	and has been reported from Riverside County, California and portions of Arizona (CNPS 2009) at approximately 1,200 feet elevation. There are 2 records from the Consortium of California Herbaria database from Riverside County from the Chuckwalla Valley where this species was observed growing in dry basins at 500 feet above MSL (CCH 2010).	the study area due to presence of suitable habitat and reported occurrences from the Chuckwalla Valley. However, this species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Desert spike moss *Selaginella eremophila*	This is a dense, mat forming, non-flowering plant. This species occurs in Sonoran creosote bush scrub habitats in gravelly or rocky soils from approximately 600 to 2,700 feet above MSL. There are 56 records in the Consortium of California Herbaria database from Riverside and San Diego counties with several records from Anza Borrego State Park, Palm Springs, Palm Canyon, and San Jacinto Mountain Range. One collection from Riverside County is from the vicinity of the Chocolate-Chuckwalla Mountain region near the north side of the Orocopia Mountains from sloped rocky, shady surfaces in gravelly soils (CCH 2010).	This species has a low potential to occur within the study area given the presence of suitable desert scrub habitat, although the Project site is located below the typical elevation range of this species. This species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Foxtail cactus *Coryphantha alversonii*	This species occurs on rocky, granitic soils in Sonoran and Mojavean desert scrub habitats from 200 feet to 4,600 feet above MSL. Prior to conducting spring 2009 field surveys, a reference population was observed on April 9, 2009 at a gravel pit northwest of Blythe along State Route 95 and several individuals were observed in relatively undisturbed Sonoran creosote bush scrub on granitic rock, a preferred habitat type of this species (CNPS 2009). There are 25 records of this species from the Consortium of California Herbaria database from Riverside, Imperial, and San Bernardino counties. There are records from the Chuckwalla Valley from rocky, granitic slopes (CCH 2010).	This species has a low potential to occur within the Project area due to the presence of suitable desert scrub habitat and appropriate elevation of the site. However, there are no rocky, granitic soils, which is required for this species. This species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Mesquite nest straw *Stylocline sonorensis*	This species occupies Sonoran desert scrub habitats around 1,300 feet elevation and has been reported from Riverside County and portions of Arizona and Sonora, Mexico (CNPS 2009). There are 2 records from the Consortium of California Herbaria database from Riverside County both from the Chuckwalla Mountains, Hayfields region from 1930 (CCH 2010).	There is low potential for this species to occur given the presence of suitable habitat although the Project occurs well below the typical elevation range of this species. This species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Orocopia sage	This species occurs in the southeastern Sonoran Desert	This species has a low potential to occur within

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Salvia greatae	and is associated with the Orocopia and Chocolate Mountains on alluvial slopes between 100 and 800 feet above MSL. There are 49 records from the Consortium of California Herbaria database several from the Chocolate, Chuckwalla, and Orocopia mountain areas (CCH 2010).	the study area due to the presence of suitable habitat and appropriate elevation range of the site. This species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Pink fairyduster *Calliandra eriophylla*	This species occurs in the Sonoran Desert in sandy washes, slopes and mesas from 350 to 5,000 feet above MSL. There are 62 records from the Consortium of California Herbaria database several from the Chocolate-Chuckwalla Mountains area in Imperial and San Diego counties (CCH 2010).	This species has a low potential to occur within the Project area due to the presence of suitable habitat and appropriate elevation range of the site. However, this species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Pink velvet mallow *Horsfordia alata*	This species occurs in the Sonoran Desert in California, Arizona, and Mexico. It occurs in Sonoran desert scrub habitats from approximately 300 to 1,500 feet above MSL.	This species was not observed during spring 2009 field surveys. There are no CNDDB records for this species for the entire state of California; the most recent collections have been from the Chocolate, Chuckwalla, and Cargo Muchacho Mountains approximately 50 miles south of the study area and are believed to be extant. Surveys will be conducted for this species in 2010.
Sand evening-primrose *Camissonia arenaria*	This species occupies sandy and gravelly areas of Sonoran desert scrub habitat and has been reported from Imperial and Riverside counties and areas of Arizona and Mexico from 200 feet to 2,700 feet above MSL (CNPS 2009). There are 13 records of this species in the Consortium of California Herbaria database several from the Chocolate-Chuckwalla Mountains, Palo Verde Valley, and Ogilby Pass area (CCH 2010).	This species has a low potential to occur within the study area due to the presence of suitable habitat and appropriate elevation of the site. However, this species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Slender woolly-heads *Nemacaulis denudata* var. *gracilis*	This species occupies desert sand dunes, coastal dunes, and Sonoran desert scrub (CNPS 2009) from 150 to 1,200 feet above MSL. There are 45 records in the Consortium of California Herbaria database from the Palm Springs, Indian Wells area in Riverside County (CCH 2010).	This species has a low potential to occur within the Project area due to suitable habitat and appropriate elevation range of the site. However, this species was not observed during spring 2009 field surveys and there are no CNDDB occurrences within 10 miles of the site.
Small-flowered androstephium *Androstephium breviflorum*	This species occurs in desert dune and Mojavean desert scrub habitats from approximately 700 feet to 2,000 feet above MSL (CNPS 2009). This species blooms from March through April and often occurs on desert bajadas.	This species has a low potential to occur within the study area given the presence of suitable desert scrub habitat, although the Project site is located below the typical elevation range of this

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
		species. The nearest CNDDB record for this species is from Cadiz Valley from Riverside and San Bernardino counties approximately one mile north of Highway 62 during 1995 from a sandy, Mojavean Desert shrub-land bajada (CNDDB 2010). This species was not observed during 2009 field surveys and will be a target species to be surveyed for during 2010 botanical surveys.
Spearleaf *Matelea parvifolia*	This species occurs on rocky ledges and slopes in Mojavean and Sonoran desert scrub habitats from 1,000 feet to approximately 6,000 feet above MSL. This species blooms from March through May (CNPS 2009). The nearest CNDDB record for this species is from the Chuckwalla Bench area during 1986 from desert dry wash woodland and creosote bush scrub habitats (CNDDB 2010).	This species is not likely to occur within the Project site. The Project site is located below the typical elevation range of this species. This species was not observed during spring 2009 field surveys.
White-margined penstemon *Penstemon albomarginatus*	White-margined penstemon is a perennial herb that is restricted to sandy substrates in desert dunes and Mojavean desert scrub habitats from approximately 2,000 feet elevation to 3,000 feet above mean sea level and appears to be restricted to the southeastern Mojave Desert ecoregion (BLM 2006, TNC 2007). In California, this plant often occurs in fine alluvial sand and in wide canyons within a creosote bush scrub community; sandy environments help establish and hold the deep taproot of this species. This species also occurs in deep, loose to stabilized sand, sometimes on sand dunes or in sandy to gravelly washes. White-margined penstemon typically blooms from March through May and flowering does not always appear to be dependent on the amount of rainfall (CNPS 2009, BLM 2006). It is believed that established plants may bloom even in very dry years by utilizing water and food resources that are stored in the large taproot (1 to 4 feet long); however rain probably affects germination rates of this species (BLM 2006, TNC 2007). White-margined penstemon occurs in southern Nevada, western Arizona,	The Genesis Project site occurs at elevations of approximately 400 feet above mean sea level which is a significantly lower elevation where this species has been reported; however given the location of the Project site in the distributional range of this species and presence of suitable habitats, this species has a potential to occur within the Genesis Project site. This species was not observed during spring 2009 or preliminary spring 2010 field surveys although white-margined penstemon was not specifically targeted during botanical field surveys.

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
	and in the western Mojave Desert in San Bernardino County (BLM 2006). There are 19 recent CNDDB records for the entire state of California all of which are from San Bernardino County near the vicinity of Highway 40 and Pisgah Crater (CNDDB 2010). There are 40 records of this species from the Consortium of California Herbaria database from the same general Ludlow and Lavic areas in San Bernardino County (CCH 2010).	
Wiggins' cholla *Cylindropuntia wigginsii* (syn=*Opuntia wigginsii*)	Wiggins' cholla is not believed to be a valid taxon and is considered a hybrid of silver cholla (C. echinocarpa) and pencil cholla (C. ramosissima) (GSEP 2009f); however, this species is covered under the NECO Plan and was targeted during spring 2009 field surveys. CNPS describes the potential taxon as occurring in Sonoran creosote bush scrub in sandy areas between 100 feet and 2,600 feet elevation. There are two records of this species from the Consortium of California Herbarium from San Bernardino and Imperial counties (CCH 2010).	Since this is not a valid taxon recognized by local botanical experts; this species is not expected to occur in the Project site.
Birds		
Bendire's thrasher *Toxostoma bendirei*	Bendire's thrashers are known in California from scattered locations in Kern, Inyo, San Bernardino, and Riverside counties. This species is a summer resident in southeastern California, and arrives at breeding grounds from mid-March through May, and departs by late August. This species favors open grassland, shrubland, or woodland with scattered shrubs, primarily in areas that contain large cholla, Joshua tree, Spanish bayonet, Mojave yucca, palo verde, mesquite, catclaw, desert-thorn, or agave. The status of populations of this species is poorly understood, but threats are believed to be loss of habitat due to urbanization, harvesting of yucca and Joshua trees, overgrazing, and off-road vehicle activity. In parts of the range, grazing may increase habitat suitability by increasing the area with scattered junipers.	The desert dry wash vegetation community provides potential habitat for this species, although it was not observed during surveys. There are CNDDB (2010) records near Desert Center from 2004.
Black-tailed gnatcatcher *Polioptila melanura*	A year round resident in southwestern United States and central and northern Mexico, in California the black-tailed gnatcatcher is found in the southeast desert wash habitat	Based on a review of the vegetation community descriptions provided by the Applicant, the Project site contains little, if any, of the dense

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
	from Palm Springs and Joshua Tree National Monument south, and along the Colorado River. It is now rare in eastern Mojave Desert north to the Amargosa River, Inyo Co. This species nests primarily in wooded desert wash habitat, but also occurs in creosote bush scrub habitat during the non-breeding season.	scrub habitat preferred by this species. They are known from the area, including from McCoy Spring, Palen Valley, and Chuckwalla Well (Fitton 2008).
Gila woodpecker *Melanerpes uropygialis*	The Gila woodpecker's range is limited to a small area of southwestern United States and northwestern Mexico. In California, this species is found only along the Colorado River and in small numbers in Imperial County. In southeastern California, Gila woodpeckers were formerly associated with desert washes extending up to one mile from the Colorado River. Currently, they are found only in riparian areas along the Colorado River.	In California, this species is currently known only from the Colorado River; therefore this species is not expected in the Project site. The Project site does not contain suitable nesting habitat for this species. The closest CNDDB (2010) record for this species is a 1986 record east of the Project site at the Colorado River.
Gilded flicker *Colaptes chrysoides*	In California, the gilded flicker is known from the southeast; habitat includes stands of giant cactus, Joshua tree, and riparian groves of cottonwoods and tree willows in warm desert lowlands and foothills. Until the mid-1990's, this species was considered a subspecies of northern flicker (*C. atratus*). This species nests primarily in cactus, but also will use cottonwoods and willows of riparian woodlands. This species may be nearly extinct in California.	This species is not expected to regularly use the Project site due to lack of suitable habitat. The closest CNDDB (2010) records for this species are along the Colorado River.
Mountain plover *Charadrius montanus*	Mountain plovers do not breed in California, but are winter visitors primarily from September to mid-March. In California they are found in the Central Valley, Antelope Valley, San Jacinto Valley, Imperial Valley, and Palo Verde Valley. Mountain plover habitat includes short-grass prairie or their equivalents, and in southern California deserts are associated primarily with agricultural areas, though use of these areas is suspected to be because of loss of native grassland and playa habitats.	This species may use the dry lakebed and nearby agricultural areas as winter habitat. The closest CNDDB (2010) record for this species is in Imperial County at the southern end of the Salton Sea.
Peregrine falcon *Falco peregrinus*	The Peregrine falcon's year-round range includes coastal and northwestern California and the Sierra Nevada and other California mountains. Additionally, this species winters inland throughout the Central Valley and in northeastern California. They are rare in the arid southeast, but they occur and are suspected to breed in the lower Colorado River Valley. Peregrine falcons require open	This species may forage on the Project site and nest in nearby mountains, but was not observed in the Project site during Project surveys. There are no CNDDB (2010) records for Riverside County.

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
	habitat for foraging, and prefer breeding sites near water. Nesting habitat includes cliffs, steep banks, dunes, mounds, and some human-made structures.	
Purple martin *Progne subis*	The historical breeding range of the purple martin includes southern California, though populations have shrunk dramatically. Neither the historical or current breeding range, however, includes the Colorado Desert. Purple martins habitat requirements include adequate nest sites and availability of large aerial insects, and therefore are most abundant near wetlands and other water sources. Threats to this species include loss of large tree and snags and competition from European starlings.	This species not expected to occur at the project site due to the lack of suitable foraging habitat. There are six CNDDB (2010) records for this species from western Riverside County, the most recent of which include nesting records from 1983 and 1993.
Vaux's swift *Chaetura vauxi*	This species is not known to breed in Riverside County or elsewhere in southern California. Very few nests have been found so their breeding range has been inferred from sightings of birds flying over potential nesting areas during their nesting season, in June and July. Vaux's swifts prefer to nest in the hollows formed naturally inside of large old conifer trees, especially snags, which are entirely lacking from the Project site.	This species was not observed during surveys and is not expected to occur due to a lack of nesting habitat on the Project site, any occurrences are expected to be of migrants only. There are no CNDDB occurrences within 10 miles of the site.
Vermilion flycatcher *Pyrocephalus rubinus*	Vermilion flycatchers are rare breeders or residents in localized areas of southern California, including along the Colorado River. They are usually found near water in arid scrub, farmlands, parks, golf courses, desert, savanna, cultivated lands, and riparian woodlands; nesting substrate includes cottonwood, willow, and mesquite.	Within the Project vicinity, occurrences of this species are limited to the Colorado River. This species is not expected in the Project site. The closest CNDDB (2010) records include a 1983 record from the Blythe golf course.
Yellow warbler *Dendroica petechia*	Yellow warblers historically bred throughout much of California except for high elevations, the Colorado Desert, and most of the Mojave Desert. Breeding abundance for this species has declined in much of California, as has the breeding range, especially in the Central Valley and parts of Owens Valley. In southeastern California, this species is known only from the lower Colorado River Valley from the middle of San Bernardino County through Riverside and Imperial Counties. Currently, this species no longer breeds in much of the Riverside County segment of the lower Colorado River Valley. This species commonly uses wet, deciduous thickets for breeding, and seeks a variety of	This species was not observed during surveys, and is not expected to nest in the Project site due to lack of suitable habitat. The closest CNDDB (2010) records for this species are two 1986 records east of the Project site at the Colorado River.

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
	wooded, scrubby habitats in winter.	
Yellow-breasted chat *Icteria virens*	The yellow-breasted chat occurs as a summer resident and migrant in California. In the southeastern California, the yellow-breasted chat breeds primarily in scattered locations in Owen's Valley and the Mojave, from the Salton Sea, and from the lower Colorado River Valley. This species occupies shrubby riparian habitat with an open canopy, and will nest in non-native species including tamarisk. Threats to this species include loss of riparian habitat, and, it is suspected, pressure from cowbird parasitism.	In this region, this species is associated with the Colorado River only. The Project site does not contain suitable habitat for this species. CNDDB (2010) records in the region are associated with the Salton Sea or the Colorado River. The closest CNDDB records for this species are two 1986 records east of the Project site at the Colorado River.
Mammals		
Arizona myotis *Myotis occultus*	This species has been found from southeastern California through Arizona, New Mexico, and south into Chihauhau, Mexico. Arizona myotis is most commonly known from conifer forests from 6,000 to 9,000 feet in elevation, although maternity roosts are known from much lower elevations including areas along the Colorado River in California.	This species is not expected to occur due to lack of coniferous forests and low elevation of the study area. The closest CNDDB (2010) record is a historical occurrence from 1945 east of the Project site near the town of Ripley.
Big-free tailed bat *Nyctinomops macrotis*	This species ranges from most of South America northward to include Mexico, Arizona, New Mexico, southern and western Texas, southern California, southeastern Nevada, southern Utah, and north and western Colorado from generally sea level to 8,000 feet in elevation. This species occurs in desert shrub, woodlands, and coniferous forests. It roosts mostly in the crevices of rocks although big free-tailed bats may roosts in buildings, caves, and tree cavities	This species has the potential to forage within the project area. The nearest occurrences for this species in Riverside County are from the vicinity of Palm Springs and Joshua Tree National Park (CNDDB 2010). There are no CNDDB occurrences within 10 miles of the site.
Burro *Equus asinus*	The burro is found mostly in Inyo and San Bernardino counties and in the vicinity of the Colorado River, its range extends into eastern Lassen County, extreme southern Mono County and south to the California/Mexico border. This species occurs in a variety of habitats near water. Such habitats include; sagebrush, bitterbrush, alkali desert scrub, desert scrub, desert succulent scrub, desert riparian, desert wash, Joshua tree, pinyon-juniper, montane chaparral, and pasture.	This species is not expected to occur within the Project area due to the lack of water resources.
California leaf-nosed bat	California leaf-nosed bat is a species of concern and a BLM Sensitive species indicating it is covered under the	All habitats within the Project area are suitable for this species. There are several CNDDB

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Macrotus californicus	NECO plan. California leaf-nosed bats occur in the deserts of California, southern Nevada, Arizona and south to northwestern Mexico. In California, they are now found primarily in the mountain ranges bordering the Colorado River Basin. In California, the two largest roosts (each sheltering 1,500 bats during winter months) are in mines in extreme southeastern California. This species depends on either caves or mines for roosting habitat. All major maternity, mating, and overwintering sites are in mines or caves (CDD 2002). Radio-telemetry studies of Macrotus in the California desert show that the California leaf-nosed bat forages almost exclusively among desert wash vegetation within 10 km of their roost (WBWG 2005-2009).	records in the vicinity of the Project area. The nearest record is from 1993 near the McCoy Mountains in creosote bush scrub habitat where approximately 300 adults were observed roosting (CNDDB 2010).
Cave myotis *Myotis velifer*	The cave myotis occurs from western Texas, to southern Nevada, southeastern California (only along the Colorado River), southward into Mexico, and is also widely distributed in Arizona. This species is found primarily at lower elevations (the Sonoran and Transition life zones) of the arid southwest in areas dominated by creosote bush, palo verde, and cactus. This species is a “cave dweller” and caves are the main roosts although this species may also use mines, buildings, and bridges for roosts.	This species has a potential to occur within the study area, more likely as a foraging species than a roosting bat species. The nearest CNDDB record for this species is approximately 3 miles east of the Project site, near the McCoy Mountains.
Colorado Valley woodrat *Neotoma albigula venusta*	Occurs from southern Nevada, southeastern California, northeastern Baja California, to western Arizona. Colorado Valley woodrats are found in a variety of habitats including low desert, pinyon-juniper woodlands, and desert-transition chaparral. Suitable habitat elements for this species include washes where organic debris gathers, areas of prickly pear cactus and mesquite, rocky areas, and crevices in boulders which are used for cover and nest sites.	This species is not expected to occur on the Project site given the lack of suitable habitat. The nearest CNDDB record is from 1934 near Blythe (CNDDB 2010).
Hoary bat *Lasiurus cinereus*	Hoary bat is the most widespread of North American bats and are highly associated with forested habitats in the west. Hoary bats roost are usually located at the edge of a clearing although more unusual roosting sites have been reported in caves, beneath rock ledges, woodpecker holes, squirrel nests, and building sides.	This species may occur in the area as a forager and may roost within the project area. The closest CNDDB (2010) record is a historical occurrence from the town of Neighbors during 1919.

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Pallid bat *Antrozous pallidus*	The pallid bat is a California species of concern and a BLM Sensitive species indicating it is covered under the NECO plan. Pallid bats inhabit low elevation (less than 6,000 feet) rocky, arid deserts and canyonlands, shrub/steppe grasslands, but also occur in higher elevation coniferous forests, greater than 7,000 feet in elevation. This species is most abundant in xeric landscapes including the Great Basin, Sonoran, and Mojave deserts (WBWG 2005-2009). Pallid bats are known from Cuba, Mexico, and throughout the southwestern and western United States. Population trends are not well known, but there are indications of decline. Pallid bats roost alone, in small groups (2 to 20 bats), or gregariously (100s of individuals). Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees with exfoliating bark, and various human structures such as bridges, barns, porches, bat boxes, and human-occupied as well as vacant buildings (WBWG 2005-2009).	This species has a potential to roost and forage within the Project area. The nearest CNDDB (2010) record is approximately 8 miles north of the Project site near the McCoy Mountains.
Pocketed free-tailed bat *Nyctinomops femorosaccus*	Pocketed free-tailed bat is a California species of concern. This species occurs in western North America, from southern California, central Arizona, southern New Mexico, western Texas, south into Mexico and Baja, California (WBWG 2005-2009). Despite only a limited number of records, pocketed free-tailed bats are known to occur in the desert from March through August, when they then migrate out of the area. In California, they are found primarily in creosote bush and chaparral habitats in proximity to granite boulders, cliffs, or rocky canyons.	This species has a potential to roost and forage within the Project site based on what is understood of its habitat requirements and roosting habits. The nearest CNDDB record for this species is from 2002 near the I-15 bridge over the Colorado River in Blythe.
Spotted bat *Euderma maculatum*	This species is known from all the states west of and including Montana, Wyoming, Colorado, New Mexico and Texas. Although broadly distributed, this species is rarely common, but may occur locally from southern British Columbia, northern Arizona, Arizona/Utah border, and western Texas from below sea level to 8,100 feet above mean sea level. Spotted bats occur in arid, low desert habitats to high elevation conifer forests and prominent	This species has a potential to roost and forage within the Project site based on what is understood of its habitat requirements and roosting habits. The nearest CNDDB record is a historical occurrence from 1907 in the Colorado Desert near Mecca (CNDDB 2010).

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
	rock features appear to be a necessary feature for roosting.	
Townsend's big-eared bat *Corynorhinus townsendii*	This species has been reported in a wide variety of habitat types ranging from sea level to approximately 9,000 feet above MSL. Habitat associations include coniferous forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types. Foraging associations include edge habitats along streams, adjacent to and within a variety of wooded habitats.	This species has a potential to forage within the study area although roosting is unlikely to occur since cave and abandoned buildings do not occur within the study area. There are no CNDDB occurrences within 10 miles of the site.
Western mastiff bat *Eumops perotis*	The subspecies that occurs in North America*, E. p. californicus*, ranges from central Mexico across the southwestern United States including parts of California, southern Nevada, Arizona, southern New Mexico and western Texas. Recent surveys have extended the previously known range to the north in both Arizona with several localities near the Utah border and California. It is found in a variety of habitats, from desert scrub to chaparral to oak woodland and into the ponderosa pine belt and high elevation meadows of mixed conifer forests. Surveys in northern Arizona have documented roosts at approximately 3,600 feet elevation and foraging bat species at 7,500 feet above MSL (WBWG 2005-2009).	The Project site does not support suitable roosting habitat for western mastiff bat but this species may utilize the study area for foraging. There are no CNDDB occurrences within 10 miles of the site
Yuma mountain lion *Puma concolor browni*	In the NECO planning area, mountain lions primarily inhabit the low mountains and extensive wash systems in and around Chuckwalla Bench, Chuckwalla Mountains, Chocolate Mountains, Picacho Mountains, Milpitas Wash, Vinagre Wash, and other washes in that area. Mountain lions typically occur in habitat areas with extensive, well-developed riparian or shrubby vegetation interspersed with irregular terrain, rocky outcrops, and community edges. Mountain lions are restricted to the southern Colorado Desert from Joshua Tree National Park south and east to the Colorado River. Burro deer, the primary prey item, are known to spend the hot summer and fall in riparian areas along the Colorado River and in dense microphyll woodlands near the Coachella Canal.	This species likely uses the Project site but no definitive sign for this species was observed during 2009 spring surveys.
Yuma myotis *Myotis yumanensis*	This species ranges across the western third of North America from British Columbia, Canada, to Baja California	This species has a potential to roost and forage within the Project site. The nearest CNDDB

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
	and southern Mexico. Yuma myotis is usually associated with permanent sources of water, typically rivers and streams, feeding primarily on aquatic emergent insects, but Yuma myotis also use tinajas in the arid west. It occurs in a variety of habitats including riparian, arid scrublands and deserts, and forests. The species roosts in bridges, buildings, cliff crevices, caves, mines, and trees.	record is from 2002 near the Blythe bridge over the Colorado River where individual bats of this species were detected acoustically during April 2002 (CNDDB 2010).
Reptiles/Amphibians		
Desert rosy boa *Charina (Lichanura) trivirgata*	In California, desert rosy boas are found only in the southern part of the state south of Los Angeles, from the coast to the Mojave and Colorado deserts (Zeiner et al. 1990, updated 1997; BLM CDD 2002). It is uncommon throughout its range. Desert rosy boas are found in habitats with moderate to dense vegetation and rocky cover, such as desert canyons, washes, and mountains. They have been found under rocks, in boulder piles and along rock outcrops and vertical canyon walls. Their diet consists of small mammals and birds. Rosy boas are primarily nocturnal, but may be out in the evening or morning in the spring and may appear during the day. The greatest activity occurs in late spring to early or mid-summer. They hibernate in winter. Desert rosy boas are not listed, but are included in the NECO and the Project area is within the range of this species.	There are 4 CNDDB records of this species from Riverside County, the majority of which are reported from western Riverside County near Cabazon, Lake Matthews, Lake Elsinore, and Hemet areas from disturbed sage scrub habitats with rocky soils and outcroppings. This species was not observed during spring 2009 field surveys; however temperatures may have been too low and therefore not during an optimal time to identify this species in the field. The Project site does not contain the preferred substrate, and therefore the site is not expected to provide important habitat for this species.
Western chuckwalla *Sauromalus obesus*	This species has no protective status or designation. Western chuckwalla occurs in southeastern California, southern Nevada, southeastern Utah, and western Arizona. Chuckwallas occur in virtually all undisturbed rocky hillsides and often escape into deep rock crevices to evade predators. These areas are typically vegetated by creosote bush and other such drought-tolerant scrub habitats.	This species was detected during spring 2009 field surveys (Solar Millennium 2009a, Volume II, Biological Technical Report). Suitable large, rock outcroppings do not occur within the Project site which is often preferred by this species.

C.2.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

CONSTRUCTION AND OPERATION - DIRECT IMPACTS, INDIRECT IMPACTS, AND MITIGATION

Direct impacts are those resulting from a project and occur at the same time and place. Indirect impacts are caused by a project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the project. The potential impacts discussed in this analysis are those most likely to be associated with construction and operation of the Project.

Impact analyses typically characterize effects to plant communities as temporary or permanent, with a permanent impact referring to areas that are paved or otherwise precluded from restoration to a pre-project state. In the desert ecosystems the definition of permanent impacts needs to reflect the slow recovery rates of its plant communities. Natural recovery rates from disturbance in these systems depend on the nature and severity of the impact. For example, creosote bushes can resprout a full canopy within five years after damage from heavy vehicle traffic (Gibson et al. 2004), but more severe damage involving vegetation removal and soil disturbance can take from 50 to 300 years for partial recovery; complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge 1999). In this analysis, an impact is considered temporary only if there is evidence to indicate that pre-disturbance levels of biomass, cover, density, community structure, and soil characteristics could be achieved within five years.

Summary of Impacts

Biological Resources Table 5 summarizes the direct, indirect, and cumulative impacts to biological resources and includes the proposed conditions of certification that would mitigate these impacts. **Biological Resources Table 6** provides a summary of acreage impacts and recommended mitigation.

Biological Resources Table 5
Summary of Impacts and Mitigation

Biological Resource	Impact/Mitigation
Sonoran Creosote Bush Scrub & Associated Wildlife	**Direct Impacts**: Permanent loss of 1,773[a,f] acres; fragmentation of adjacent wildlife habitat and native plant communities **Indirect Impacts**: Disturbance (noise, lights, dust) to surrounding plant and animal communities; spread of non-native invasive weeds; changes in drainage patterns downslope of Project; erosion and sedimentation of disturbed soils. **Cumulative Impacts**: Contributes 0.8% to cumulative loss from probable future projects within the NECO planning area (**Table 18**). **Mitigation**: Off-site habitat acquisition and enhancement (**BIO-12**); implement impact avoidance and minimization measures (**BIO-8)** and Weed Control Plan (**BIO-14**)
Waters of the State & Associated Sensitive Plant Communities	**Direct Impacts**: Loss of hydrological, geomorphic, and biological functions and values of 91[b] acres of State waters(73 acres permanent loss, 18 acres temporary loss) including 16[b] acres of microphyll woodland **Indirect Impacts**: Permanent loss of hydrological connectivity downstream of the Project, including 21[c] acres unvegetated ephemeral wash; head-cutting on drainages upslope and erosion/sedimentation downslope; * **Cumulative Impacts**: Contributes 2.9% to cumulative loss from future projects within the NECO planning area (**Table 11**); contributes 4.6% to cumulative loss from future projects within the Chuckwalla- Ford Dry Lake watershed (**Table 10**). **Mitigation**: Acquisition and enhancement of 132 acres ephemeral desert washes (**Table 6**), implementation of avoidance and minimization measures to protect state waters (**BIO-22**); implement Weed Management Plan (**BIO-14**)
Desert Tortoise	**Direct Impacts**: Potential take of individuals during operation and construction; permanent loss of 1, 773[d,f] acres (including 23[d] acres of critical habitat) of desert tortoise habitat and fragmentation of surrounding habitat. **Indirect Impacts**: Increased risk of predation from ravens, coyotes, feral dogs; disturbance from increased noise and lighting; introduction and spread of weeds; increased road kill hazard. **Cumulative Impacts**: Contributes to cumulative loss of low to moderate value desert tortoise habitat (2.0% to 0.1 habitat value, 2.9% to 0.2 habitat value, 0.1% to 0.3 habitat value) from future projects in the NECO planning area (**Table 12**); **Mitigation**: Implement avoidance and minimization measures (**BIO-6** through **BIO-11**) and acquire 1,864 acres of desert tortoise habitat (**BIO-12**).
Mojave Fringe-Toed Lizard	**Direct impacts**: Mortality to individuals during construction and permanent loss of 1[a,f] acres of sand dune habitat and 37 acres of sand drift over playa; increased road kill hazard from construction traffic; potential accidental direct impacts to

Biological Resource	Impact/Mitigation
	adjacent preserved habitat during construction and operation. **Indirect impacts**: Disruption of sand transport corridor resulting in downwind impacts to 151[e] acres; introduction and spread of invasive plants; erosion and sedimentation of disturbed soils; fragmentation and degradation of remaining habitat; increased road kill hazard from construction and operations traffic; harm from accidental spraying/drift of herbicides and dust suppression chemicals. **Cumulative Impacts**: Contributes 0.2% to cumulative loss from future projects within the NECO planning area; contributes 1.7% to cumulative loss from future projects within the range of the Chuckwalla Valley population (**Table 15**). **Mitigation**: Implement **BIO-20**, Mojave fringe-toed lizard compensation, and **BIO-8**, impact avoidance and minimization measures
Couch's Spadefoot Toad	**Direct Impacts:** loss of breeding and upland habitat, mortality of individuals; disturbance to breeding ponds, **Indirect Impacts:** reduced flow to breeding areas, increased flow to upland habitat, construction noise could trigger emergence when conditions are not favorable. **Cumulative Impacts**: Contributes 1.6% to cumulative loss of habitat from future projects within the NECO planning area (**Table 15**). **Mitigation**: Conduct surveys and implement impact avoidance and minimization measures, avoidance and protection of breeding habitat **BIO-27** (Couch's spadefoot toad impact avoidance and minimization measures).
Western Burrowing Owl	**Direct Impacts**: Permanent loss of foraging habitat; potential loss of eggs and young; degradation and fragmentation of remaining adjacent habitat from edge effects; disturbance of nesting and foraging activities for nesting pairs near the plant site and linear facilities; **Indirect Impacts**: increased road kill hazard from operations traffic; potential collision with mirrors; increased predation from ravens; disturbance of nesting activities from operations. **Cumulative Impacts**: Contributes 0.5% to cumulative loss from future projects within the NECO planning area (**Table 15**). **Mitigation:** Implement burrowing owl impact avoidance and mitigation measures, including habitat acquisition if owls are displaced by the Project (**BIO 18**, Burrowing owl impact avoidance, minimization, and compensation measures)
Golden Eagle	**Direct/Indirect Impact**: Loss of foraging habitat; potential disturbance to nesting golden eagles during construction if active nests occur within 10 miles of Project boundaries **Cumulative Impacts**: Contributes 7.4% to cumulative loss of Sonoran creosote bush scrub and 0.2% to loss of dry desert wash woodland, and 0.6% to loss of sand dune foraging habitat from future projects within the NECO planning area within 10 miles of the Project. Contributes 0.8% to cumulative loss of Sonoran creosote bush scrub and 0.03% to loss of dry desert wash woodland, and 0.6% to loss of sand dune foraging habitat from future projects within 10 miles of the nearest

Biological Resource	Impact/Mitigation
	mountains (**Table 16**). **Mitigation**: Implementation of Golden Eagle Nest Inventory and Monitoring (**BIO-28**) and off-site habitat acquisition and enhancement for desert tortoise would protect eagle foraging habitat (**BIO-12**); additional mitigation may be required pending USFWS guidance.
Special-Status Birds & Migratory Birds	**Direct Impacts**: Permanent loss of breeding and foraging habitat, including loss of 1, 773[a,f] acres of Sonoran creosote bush scrub and 16[b] acres of microphyll woodland; potential loss of eggs and young; disturbance of nesting and foraging activities for populations on and near the plant site and linear facilities; degradation and fragmentation of remaining adjacent habitat from edge effects. **Indirect Impacts**: increased road kill hazard from operations traffic and collision with mirrors; increased predation from ravens; disturbance from operations. **Cumulative Impacts**: Contributes 0.6% to cumulative loss of habitat from future projects within NECO planning area (**Table 15**, Le Conte's Thrasher). **Mitigation**: Implement impact avoidance and minimization measures (**BIO-8**); pre-construction nest surveys (**BIO-15**); avian protection plan (**BIO-16**) off-site habitat acquisition and enhancement (**BIO-12** and **BIO-22**)
Desert Kit Fox & American Badger	**Direct Impacts**: Permanent loss of 1,811 [a,f] acres of foraging and denning habitat; fragmentation and degradation of remaining habitat, loss of foraging grounds, crushing or entombing of animals during construction; increased risk of road kill hazard from construction traffic. **Indirect Impacts**: Disturbance from increased noise and lighting; introduction and spread of weeds; increased risk of road kill from operations traffic. **Cumulative Impacts**: Contributes 0.5% to cumulative loss of habitat from future projects within the NECO planning area (**Table 15**). **Mitigation:** Implementation of impact avoidance and minimization measures (**BIO-8**), conduct pre-construction clearance surveys (**BIO-17**); off-site habitat acquisition and enhancement (**BIO-12** and **BIO-22**)
Nelson's bighorn sheep	**Direct Impacts:** None **Indirect Impacts:** harassment from elevated construction noise **Cumulative Impacts**: None (**Table 13** and **Table 14**) **Mitigation:** Implementation of noise-related avoidance and minimization measures (**BIO-8**).
Bats	**Direct/Indirect/Cumulative Impacts**: Loss of foraging habitat. **Mitigation:** off-site habitat acquisition and enhancement (**BIO-12** and **BIO-22**)
Special Wildlife Management Areas	**Chuckwalla DWMA/Desert Tortoise Critical Habitat:** Impacts to 23[d] acres **ACEC**: None **WHMA:** Impacts to1,811[a,f] acres **Mitigation**: Mitigate loss of critical habitat with acquisition and

Biological Resource	Impact/Mitigation
	preservation of suitable desert tortoise at a 5:1 ratio (**BIO-12**).
Special-status Plants ▪ Harwood's eriastrum ▪ Harwood's milk-vetch ▪ Ribbed cryptantha ▪ Desert unicorn plant ▪ Late-season special-status plants	**Direct Impacts:** Potential impacts to BLM Sensitive Harwood's eriastrum (CNPS 1B) from gen-tie construction near substation; Harwood's milk-vetch (CNPS 2) on linears and solar plant site; desert unicorn plant (CNPS 4) at solar plant site; ribbed cryptantha (CNPS 4) on linears and solar plant site. Potential direct impacts to CNPS 1B, 2, 4 and new taxa detected during late season surveys. **Indirect impacts:** Fragmentation/isolation and reduced gene flow between isolated fragments of area population; introduction and spread of invasive plants; erosion and sedimentation of disturbed soils; potential disruption of sand transport systems that maintain habitat below the Project; alteration of drainage patterns; herbicide drift; disruption of photosynthesis and other metabolic processes from dust. Construction of SCE substation could cause loss of over 1000 individuals of Harwood's eriastrum. **Cumulative Impacts:** Contributes to cumulative loss of plants and habitat, and indirect effects to Harwood's eriastrum, Harwood's milk-vetch, desert unicorn plant and ribbed cryptantha from other I-10 corridor projects and throughout range. Contributes 0.7% to cumulative loss of Harwood's milk-vetch habitat from future projects within the NECO Planning Area. Contributes cumulative loss of dune-, playa-, and wash habitat for other special-status species in Chuckwalla Valley: 4.6% desert washes in Chuckwalla Valley; 1.7% dunes and sand fields; 0.2% playa (**Tables 15,19**). **Mitigation:** Implement **BIO-19** - avoidance requirements for Harwood's eriastrum; off-site compensation or restoration mitigation for Harwood's milk-vetch; general avoidance and minimization measures for all special-status plants. Implement late-season surveys and mitigate according to triggers and performance standards in **BIO-19**. Indirect effects and impacts to habitat also addressed in Weed Management Plan (**BIO-14**); Best Management Practices (**BIO-8**); special-status plant impact avoidance and minimization measures and potential habitat compensation (**BIO-19**), acquisition of sand dune habitat (**BIO-20**).
Groundwater-Dependent Plant Communities	**Direct:** None **Indirect/Cumulative:** Degradation of groundwater-dependent plant communities (e.g., mesquite bosque, bush seep-weed) from water table drawdown **Mitigation:** Conduct long-term monitoring of groundwater-dependent vegetation (**BIO-25**) and implement adaptive management, if necessary (**BIO-26**).

a. From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities").
b. From TTEC 2010l (TetraTech memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project").
c. From TTEC 2010j (TetraTech Notification of a Lake or Streambed Alteration Agreement Application, Appendix D).
d. From TTEC 2009c (TetraTech Application for Incidental Take of Threatened and Endangered Species).
e. From Soil & Water Appendix A, calculation of the downwind impacts to Mojave fringe-toed lizard habitat from Project intrusion into sand transport corridors.
f. From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").

Biological Resources Table 6
Acreage of Direct and Indirect Impacts to Biological Resources and Recommended Mitigation

Resource	Acres Impacted	Mitigation Ratio	Recommended Mitigation Acreage
Desert Tortoise Habitat – Direct Impacts			
Within DWMA/Critical Habitat[1]	23	5:1	115
Outside Critical Habitat[2,7]	1,749	1:1	1,749
Total Desert Tortoise Mitigation			**1,864**
Stabilized/Partially Stabilized Sand Dunes – Direct Impacts			
Direct Impacts[3,7]	1	3:1	3
Playa and Sand Drifts Over Playa			
Direct Impacts[3,7]	37	3:1	111
Indirect Impacts to MFTL Habitat[4,8]	151	0.5:1	76
Total Mojave Fringe-toed Lizard Mitigation			**190**
State Waters* - Direct Impacts[5]			
Microphyllous Riparian Vegetation	16	3:1	48
Unvegetated Ephemeral Dry Wash	74	1:1	74
State Waters- Indirect Impacts[6]			
Unvegetated Ephemeral Dry Wash	21	0.5:1	10
Total State Waters Mitigation			**132**

1 *From Application for Incidental Take Permit (TTEC 2009c).*
2 *From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities"); includes impacts to Sonoran creosote bush scrub.*
3 *From CEC 2010d; includes direct permanent impacts to stabilized and partially stabilized sand dunes and sand drifts over playas.*
4 *From **Soil & Water Appendix A**, calculation of the downwind impacts to Mojave fringe-toed lizard habitat from Project intrusion into sand transport corridors.*
5 *From TTEC 2010l (TetraTech memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project").*
6 *From Appendix D, Lake and Streambed Alteration Agreement Application (TTEC 2009d).*
7 *From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").*
8 *PWA 2010a. (tn pending) PWA memo "Genesis Solar Energy Project, Analysis of Impacts to Sand Transport Corridor")...*
* Reflects changes Also, the removal of the 'toe' from the plant site footprint would also reduce impact acreage to state waters; however these reduced impact calculation have not been provided to date and therefore, are not included in this table.

Recent Project Modifications

The Applicant recently proposed some minor modifications to the Project (TTEC 2010o) that were not discussed in their Application for Certification (GSEP 2019a) or analyzed in staff's SA/DEIS. These modifications include a six-pole transmission line extension at the Colorado River Substation and an electrical distribution/telecommunications line.

Six Pole Transmission Line Extension

The transmission line from the Genesis power plant site to the point of interconnect at Southern California Edison's (SCE's) future Colorado River Substation is referred to as

the project's generation or "gen-tie" transmission line and is part of the Genesis project description. SCE's Colorado River Substation is not part of the Genesis project description, but rather is an SCE project for which SCE would obtain a permit, construct, own and operate to serve several projects in the area.

As described in the Application for Certification (GSEP 2009a) the Genesis gen-tie would start at the Genesis power plant site and extend approximately 7 miles southeast until reaching the existing Blythe Energy Transmission Line Project (BETP). From that point, the Genesis gen-tie would be strung eastward along existing BETP poles until it leaves the BETP to enter into the Colorado River Substation. Because the BETP runs immediately to the south of the proposed Colorado River Substation location, the Applicant’s original impact analysis (GSEP 2010a) was based on the assumption that the gen-tie would go directly from the BETP poles into the south side of the CRS in a single span. However, SCE recently provided Genesis with a substation design that now requires the gen-tie, after it leaves the existing BETP poles, to come up around the western side of the substation and enter from the north (TTEC 2010o). The Applicant would therefore need to add up to six additional gen-tie poles before entering the CRS.

Construction of six additional poles would result in disturbance to 4.6 acres from construction and laydown areas, conductor pulling areas, and the transmission access road (TTEC 2010o). Within this temporary 4.6-acre impact area 1.2 acres would be permanently affected due to the 6-foot by 6-foot pole construction pad and the 3,700-foot long, 14-foot wide transmission maintenance road.

Staff has no information from the Applicant regarding the habitat types that would be permanently and temporarily impacted by the construction of the six power poles, but infers that the six new poles and the maintenance road would be constructed within sand dune habitat. The basis for this inference is Figure DR-BIO-51-2 from the Data Response submitted for the Blythe Project (AECOM 2010e). This figure shows, at a coarse scale of 1 inch = 6000 feet, the approximate location of the proposed Colorado River Substation and depicted it as being entirely within stabilized and partially stabilized sand dune. Supporting this inference is the Applicant’s submittal which included the 2010 preliminary survey results from the Blythe Project (TTEC 2010o, Attachment A) which showed numerous records for species that occur on sand dune habitat (for example Mojave fringe-toed lizard and ribbed cryptantha) in and around the proposed Colorado River Substation location.

Staff does not have sufficient information to revise Table 6, the summary of impacts to different habitat types, or to specify mitigation acreages for the impacts to sand dunes, Sonoran creosote scrub or state waters. Those revisions require specific information as to the extent of impacts to each habitat type. However, staff can provide a qualitative evaluation and can conclude that impacts to biological resources from construction of the six-pole transmission line extension can be mitigated to less than significant levels with implementation of staff’s proposed conditions of certification.

A number of sensitive species were observed in the vicinity of the proposed substation during the 2010 surveys, including many Mojave fringe-toed lizards (TTEC 2010o, Attachment A, Figure 4, Incidental Wildlife Observations Spring 2010 Surveys). The transmission line extension construction could therefore result in direct and indirect

impacts to Mojave fringe-toed lizards and to their habitat. This impact would be mitigated to less than significant levels with staff's Condition of Certification **BIO-20**.

No desert tortoise were detected in or within the one-mile buffer around the proposed substation during the 2010 surveys (TTEC 2010o), but given the proximity of good habitat in the immediate vicinity of the proposed substation desert tortoise could occur in or near transmission line construction areas and could be directly or indirectly impacted. Implementation of staff's proposed conditions of certification **BIO-9** through **BIO-12** would reduce potential impacts to desert tortoise to less than significant levels. Construction activities and addition of new perching structures such as poles could result in increased ravens, and hence an increase in desert tortoise predation. This impact would be mitigated with implementation of staff's proposed Condition of Certification **BIO-13**, the Raven Management Plan. Road construction could increase the opportunities for non-native invasive plant species, with adverse effects to native plant and wildlife communities. These impacts could be reduced to less than significant levels with implementation of **BIO-14**, the Weed Management Plan, and **BIO-24**, Revegetation of Temporarily Disturbed Areas. Nesting birds, badger and kit fox, and burrowing owls could all be directly or indirectly affected by construction activities. These impacts would be reduced to less than significant levels with implementation of **BIO-15** (Pre-construction Nest Surveys), **BIO-17** (Badger and Kit Fox Avoidance and Minimization Measures) and **BIO-18** (Burrowing Owl Avoidance and Minimization Measures).

The Applicant's submittal describing the proposed project modifications (TTEC 2010o) did not include information on the presence of state waters in the proposed substation area. However, if ephemeral drainages were impacted in the course of constructing the six-pole transmission line extension, direct and indirect impacts would be mitigated with implementation of staff's proposed Condition of Certification **BIO-22**.

Staff has concluded that direct and indirect impacts to special status plant species is also possible with the construction and operation of the six-pole transmission line because the 2010 surveys revealed many sensitive plants within and near the proposed substation (TTEC 2010o, Attachment A, Figure 2, Preliminary Results, Botany, Rare Plants, Spring 2010 Surveys). Species detected include Harwood's eriastrum, Harwood's milk-vetch, winged cryptantha and ribbed cryptantha. Harwood's eriastrum, a California endemic and BLM Sensitive species, has a global distribution restricted to the southeast corner of California, and it is known from only 14 documented locations. As described below in the subsection on impacts to special-status plants, direct or indirect impacts to Harwood's eriastrum or Harwood's milk-vetch would be significant. Late summer/fall botanical surveys might also reveal the presence of additional sensitive plant species in the vicinity of the proposed six-pole transmission line. The avoidance, minimization and compensation measures described in Condition of Certification **BIO-19** (Special-Status Plant Mitigation) would minimize the impacts to Harwood's eriastrum, Harwood's milk-vetch, and any other special status plant species to a level less than significant.

For fulfillment of the mitigation measures described above, conditions of certification **BIO-1** through **BIO-8** would also need to be implemented because these conditions provide the appropriate personnel (Designated Biologist and Biological Monitors),

worker training, impact avoidance and minimization measures and monitoring needed to make sure all mitigation is conducted as specified in the conditions.

Distribution and Telecommunications Line

The Genesis Project will need temporary power and communication during construction at the plant site footprint. Although this need was inferred in the Applicant's Application for Certification (GSEP 2009a) it was not identified as a separate feature or analyzed in the SA/DEIS. The Project will need to tap into electrical power from an existing SCE distribution line near I-10. This distribution/ telecommunications line would follow the proposed Genesis linear corridor and access road up to the plant facility (TTEC 2010o). This installation could either be above or below ground based on site conditions and availability of material. The type of material is likely to be single wood poles (TTEC 2010o). Once the construction phase of the project is complete, these lines would likely be left in place to serve the onsite facilities such as offices, warehouse, and a control room. The development of the distribution line would follow the current SCE's standards, guidelines and procedures for installation of electrical distribution power lines (TTEC 2010o).

The distribution/telecommunications line would be built within the disturbed linear corridor and would be adjacent to the final gen-tie line (TTEC 2010o). The Applicant has indicated that the creation of the distribution/ telecommunications line would not create additional impacts other than the physical area needed for the permanent pole pads, and that these impacts would be calculated and quantified in a subsequent document (TTEC 2010o). Staff would need additional information, including a detailed project description and figures showing the location of the proposed line, to reach conclusions about the extent of impacts to biological resources from construction and operation of the distribution/ telecommunications line. However, staff agrees that these impacts are likely to be relatively small, and that staff's proposed conditions of certification would likely be sufficient to reduce impacts to biological resources to less than significant levels.

Waters of the State: Impacts and Mitigation

Biological Resources Table 6 summarizes the direct and indirect impacts to waters of the state as a result of Project construction, and includes recommendations from Energy Commission staff and CDFG for compensatory mitigation ratios for these impacts.

Grading within the Project Disturbance Area and its ephemeral drainages would directly impact 91 acres of state jurisdictional waters, and for 73 of these acres it would permanently eliminate their hydrological, biogeochemical, vegetation and wildlife functions. Eighteen acres of drainages would be temporarily impacted by construction of linear facilities and access roads associated with those facilities.

Desert washes downstream from the Project area, comprising approximately 21 acres of state waters, would also be indirectly impacted as a result of changes to upstream hydrology, with downstream vegetation in washes deprived of flows or receiving lower or higher volumes and velocities of water than current conditions at discharge points along the stormwater conveyance channel. Diversions could significantly alter the

hydrology and wash-dependent vegetation of any features that may occur downstream of the Project area, an effect that is quite apparent below Interstate 10 (I-10) near the Corn Springs Exit. On the northern side of I-10 broad expanses of desert wash trees and shrubs have died in response to the construction of I-10 and the diversion of smaller channels into collector ditches on the southern side of I-10.

The Applicant has provided drainage plans that conceptually discuss how diffusers at the downstream end of the engineered channels would restore sheet flow downslope of the Project Disturbance Area. However, as discussed in the **Soil & Water,** the drainage report does not provide sufficient information to establish the post-Project flooding conditions or to determine the potential impacts to vegetation downstream. Other potential indirect effects of the changed proposed drainage plans are erosion and resulting root exposure leading to the eventual death of vegetation. Washes upstream of the Project area may also be impacted by head-cutting and erosion; however, bank stabilization measures are proposed for the intake portion of the channel that would minimize or avoid this potential effect. Staff assumes that all 21 acres of the ephemeral washes occurring downstream of the Project boundaries would be adversely affected by the proposed Project.

Staff considers direct impacts of the Project to 91 acres of state jurisdictional waters and indirect impacts to as many as 21 acres to be significant. The extensive ephemeral drainage network at the Project site currently provides many functions and values, including landscape hydrologic connections, stream energy dissipation during high-water flows that reduces erosion and improves water quality, water supply and water-quality filtering functions, surface and subsurface water storage, groundwater recharge, sediment transport, storage, and deposition aiding in floodplain maintenance and development, nutrient cycling, wildlife habitat and movement/migration; and support for vegetation communities that help stabilize stream banks and provide wildlife habitat. The Project would eliminate all of these functions and values on at least 73 acres of ephemeral washes, and would temporarily impact these functions on another 18 acres.

To replace the flood conveyance function and some of the biogeochemical functions of the impacted desert washes, the Applicant has proposed to replicate the existing flow patterns and volume with three channels that would be constructed adjacent to, through, or across the site. Channel design, in particular the proposed plans for restoring sheet flow to the terrain downslope of the Project boundaries, has yet to be finalized.

The engineered channels would not replace the biological resource values and functions of the Project's ephemeral washes. Staff and CDFG agree that off-site acquisition and enhancement of off-site state waters would mitigate Project impacts to waters. Staff and CDFG have proposed mitigation at a 1:1 ratio for unvegetated ephemeral drainages, and at a 3:1 mitigation ratio for microphyll woodlands, the higher ratio reflecting the high wildlife values and scarcity of this habitat type. Indirect impacts to state waters would be mitigated at half the ratio of direct impacts, as detailed in **Biological Resources Table 6**. The lesser mitigation ratio for indirect impacts to drainages downgradient of the Project site reflects staff's expectation that while the wash-dependent vegetation downslope of altered drainages would eventually be lost, that loss would be slow and gradual. Staff anticipates that the wash-dependent

vegetation downstream of the Project deprived of flows would continue to provide habitat for years and possibly decades after the Project is constructed, although eventually it would die (if deprived of flows) or be indirectly affected by erosion and sedimentation along reaches below the stormwater channel discharge points.

Staff's proposed Condition of Certification **BIO-22** recommends off site acquisition of 132 acres of waters of the state within the Chuckwalla Valley watershed, with at least 48 acres of that consisting of microphyllous riparian vegetation. This condition also provides the specifics of avoidance and mitigation measures for impacts to ephemeral drainages within and downslope of the Project Disturbance Area. Implementation of Condition of Certification **BIO-22** would reduce Project impacts to state waters to less than significant levels, and would satisfy CDFG codes relating to protection of state waters.

Impacts to Sand Transport Corridor and Mojave Fringe-toed Lizard Habitat

The Project's western solar array is located on land surface units that are relatively geomorphically stable and are not within an active wind transport corridor. As originally configured the eastern solar array of the Project intruded into the outer edges of the Palen-McCoy Valley Sand Transport Corridor, which delivers sand to Mojave fringe-toed lizard habitat downwind. The Applicant estimated that the easternmost end of the Project's eastern solar array extended approximately 1000 feet (19 percent) of the width of this corridor (Worley Parsons 2010c). The Applicant recently revised their Project footprint (TTEC 2010o) to eliminate 41.4 acres of the easternmost array, thus avoiding intrusion into the Palen-McCoy Valley Sand Transport Corridor.

The southwestern corner of the eastern solar array extends into another sand transport corridor, the PDL-Chuckwalla Valley Sand Transport Corridor, which moves sand from northeast to southwest. The intrusion extends into the corridor by approximately 1,600 feet at a point where the corridor is 24,000 feet wide, approximately 7 percent of the width of the corridor (Worley Parsons, 2010c). Staff agrees with the Applicant's estimates on the extent of the Project intrusion into this sand transport corridor.

Staff has concluded that the Project intrusion within the PDL-Chuckwalla Valley Sand Transport Corridor would not result in a substantial reduction in sand transport capacity. However, the presence of the southwestern corner of the eastern solar array would diminish the input of sand to downwind areas, with adverse effects to the active sand layer that is crucial to Mojave fringe-toed lizard habitat. Staff estimates that an area of 151 acres of vegetated sand dune habitat downwind of the intrusion within the PDL-Chuckwalla Valley Sand Transport Corridor would be adversely affected by interference with this sand transport corridor (PWA 2010a). This downwind area would receive reduced sand input because of interference from Project features, deflating downwind sand dunes and gradually diminishing their depth and extent over time as sand output exceeds sand input.

Habitat suitability for Mojave fringe-toed lizards would be gradually degraded as wind-borne sand is depleted and not replaced within these downwind areas. Project impacts to Mojave fringe-toed lizard as a result of these indirect habitat impacts are discussed below in the subsection on Special-Status Species: Impacts and Mitigation.

The Project would also have an indirect impact on the creation and maintenance of sand transport as a result of rerouting of the ephemeral drainages in the Project area. More than a hundred ephemeral washes cross the site from north to south. The boundaries of these shallow channels are typically subtle, and the presence of these channels in areas of desert varnish and soil horizons suggests that these channels are relatively stable (i.e., do not cut and fill vertically) The channels in the western portion of the Project area do not appear to transport much sediment, as evidenced by their shallow depth and the absence of scour features (**Soil and Water Appendix A**). However, larger washes at the eastern side of the Project area have braided channels that show more evidence of active sediment transport, with better-defined banks and some sand in the channel bottom. Unlike the small washes that cross the western solar array site, the larger washes appear to supply a large amount of sand to the surrounding area. The Applicant has not provided a quantitative or qualitative assessment of the changes in fluvial sand transport as a result of re-routing the ephemeral drainages in the project area, but staff anticipates that Project would result in a reduction in the water-borne sand available for transportation to downwind sand dunes systems.

The Project linear facilities would pass through the core of the Palen-McCoy Valley Sand Transport Corridor, where considerable sand transport occurs (Worley Parsons 2010c, Soil and Water Appendix A). Staff has concluded that the Project should be able to avoid or minimize impacts created by the linear facilities within this zone; most wind-borne transport of sand occurs within three feet of the ground, so the buried gas pipeline and at-grade access roads would be flush with the surrounding ground surface and would not create ground level obstructions. Transmission line supports should not pose a problem due to their small surface area at ground level.

Special-status Species: Impacts and Mitigation

Mojave Fringe-toed Lizard

The Genesis Project would directly impact 0.8 acres of stabilized/partially stabilized sand dune habitat and 37 acres of playa/sand drifts over playa (CEC 2010d). In addition to this direct and immediate loss of habitat, the project would indirectly affect 151 acres of Mojave fringe-toed lizard habitat downwind of the Project Disturbance Area (see **Soil & Water Appendix A;** PWA 2010a). As discussed above, the southwestern corner of the eastern solar array extends south into the PDL-Chuckwalla Valley Sand Transport Corridor (Worley Parsons, 2010c).

The Mojave fringe-toed lizard relies on vegetated sand dunes and a regular supply of fine wind-blown sand for its habitat. Active sand dunes (i.e., dunes that have an active layer of mobile sand) exist in a state of dynamic equilibrium, continuously losing sand downwind due to erosion and transport and gaining new supplies from upwind. If the upwind sand supply is cut off the dunes deflate, losing sand downwind and shrinking in size and depth. The finest sand (which is most easily transported) is lost first with coarser sand and gravel being left behind to form an armor or lag. This lag does not support Mojave fringe-toed lizard habitat.

As discussed above, the Project may also have an impact on sand transport and Mojave fringe-toed lizard habitat by eliminating the network of desert washes throughout

the site and replacing them with engineered channels (**Soil & Water Appendix A**). Project construction on the alluvial fans and alteration of stream channels by channelization may reduce the amount of fluvial sediment reaching the depositional areas upwind of sand dunes and Mojave fringe-toed lizard habitat. Similar effects have been observed in the Coachella Valley, with adverse consequences for Coachella Valley fringe-toed lizard habitat (Griffiths et al. 2002). The extent of the Project impact to fluvial sand transport is unknown, but is expected to contribute at least incrementally to loss of Mojave fringe-toed lizard habitat.

Other potential indirect impacts of the Project to Mojave fringe-toed lizards include mortality from vehicle strikes; introduction and spread of invasive plants; erosion and sedimentation of disturbed soils; fragmentation and degradation of remaining habitat; increased road kill hazard from operations traffic; harm from accidental spraying or drift of herbicides and dust suppression chemicals; and an increase in access for avian predators (such as loggerhead shrikes) due to new perching structures.

As described in subsection C.2.8, Cumulative Impacts, future proposed projects would cumulatively cause losses over a substantial portion of Mojave fringe-toed lizard habitat. Approximately 16 percent of the Mojave fringe-toed lizard habitat in the NECO planning areas would be affected if all proposed projects were constructed (see subsection C.2.8, Cumulative Impacts). The Genesis Project's contribution to the direct loss of habitat for the Chuckwalla Valley population of Mojave fringe-toed lizard is 0.2 percent. These effects are exacerbated when combined with the expected indirect effects to Mojave fringe-toed lizard habitat from interruption of aeolian sand transport; diversions of desert washes and interruption of fluvial transport of sand that contribute to the maintenance of habitat; and the continuing spread of non-native weedy species such as the Sahara mustard and Russian thistle in the Chuckwalla Valley.

The distribution of Mojave fringe-toed lizards is naturally fragmented because of its obligate habitat specificity to a patchy habitat type, and many local populations of this species are quite small, with small patches of sand supporting small populations of lizards. This fragmented pattern of distribution leaves the species vulnerable to local extirpations from additional habitat disturbance and fragmentation (Murphy et al. 2007). The Mojave fringe-toed lizard population in the Chuckwalla Valley, along with a very small population in Joshua Tree National Park's Pinto Basin, represents the southernmost distribution of this species (Barrows pers. comm.). This southern population may represent an important gene pool in light of the likely warming and drying that will occur in this region as a result of climate change; these southernmost lizards that may already be adapted to hotter and drier conditions than those further north and could represent a source of genetic variation that could stave off extinction of this species in selected refugia (Barrows pers. comm.).

The Applicant disagrees with staff's assessment of the indirect impacts to Mojave fringe-toed lizard habitat, and asserts that the downwind "sand shadow" area that staff considered affected by intrusion into the Palen-McCoy Valley Sand Transport Corridor does not provide suitable habitat for Mojave fringe-toed lizards (TTEC 2010n). To support their conclusion the Applicant notes that surveys in 2009 and 2010 did not reveal the presence of Mojave fringe-toed lizards in this area (TTEC 2010n). They further note that ribbed cryptantha, a plant species that requires loose wind blown sand

like Mojave fringe-toed lizards, is also absent from areas that staff have depicted as within a potential sand shadow. However, staff notes that surveys did reveal the presence of at least one ribbed cryptantha in the sand shadow area (TTEC 2010n). Furthermore, the Applicant has provided no information regarding how the Mojave fringe-toed lizard surveys were conducted, and whether the methods used for the 2009 and 2010 surveys were adequate to conclude absence of this species. In addition, the Applicant has provided no site specific information regarding the habitat characteristics of the sand shadow areas compared to those areas in which Mojave fringe-toed lizards were observed.

Staff remains willing to reconsider conclusions about the suitability of the 151 acres indirectly affected for Mojave fringe-toed lizard, but would need additional information to do so. That information would need to include new, systematic survey data that would be adequate to confirm absence of Mojave fringe-toed lizards, or evidence that the surveys conducted in 2009 and 2010 were adequate for such conclusions. In addition, staff would need a detailed description of the habitat within the sand shadow area compared to those areas that support Mojave fringe-toed lizards, particularly with respect to features such as loose, wind-blown sand.

Staff considers the direct, indirect, and cumulative effects of the Project to be significant for the Chuckwalla Valley Mojave fringe-toed lizard population. Indirect effects include the reduction in sand supply to the sand transport corridor from alteration of Project area drainages as well as the sand shadow effect resulting from intrusion of the project into the sand transport corridor. The cumulative impact of all the proposed projects would be to increase the already fragmented distribution of the Mojave fringe-toed lizards, and to increase the risk of extirpation of isolated populations within the Chuckwalla Valley. Staff's proposed Condition of Certification **BIO-20** recommends acquisition and protection of core populations of Mojave fringe-toed lizard habitat elsewhere in the Chuckwalla Valley. Staff proposes compensatory mitigation at a 3:1 ratio for direct impacts to sand dune and sand drifts over playa, as required by NECO. Staff also proposes mitigation at a 0.5:1 ratio for the 151 acres indirectly affected. Staff has concluded that the habitat acquisition and protection proposed in Condition of Certification **BIO-20** would, if implemented, reduce Project impacts to Mojave fringe-toed lizards to less than significant levels.

Desert Tortoise

Direct Impacts

During construction of the Genesis Project desert tortoises may be harmed during clearing, grading, and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. Other direct effects could include individual tortoises being crushed or entombed in their burrows, collection or vandalism, disruption of tortoise behavior during construction or operation of facilities, disturbance by noise or vibrations from the heavy equipment, and injury or mortality from encounters with worker's or visitor's pets. Desert tortoises may also be attracted to the construction area by application of water to control dust, placing them at higher risk of injury or mortality. Increased human activity and vehicle travel would occur from the construction and improvement of access roads, which could

disturb, injure, or kill individual tortoises. Also, tortoises may seek shade by taking shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved.

The Applicant has recommended impact avoidance and minimization measures to reduce these direct impacts to desert tortoise, including installation of exclusion fencing to keep desert tortoise out of construction areas, relocating/translocating the resident desert tortoise from the Genesis Project site, reducing construction traffic and speed limits to reduce the incidence of road kills and worker environmental awareness training programs.

Staff has incorporated these recommendations into conditions of certification. These include staff's proposed Conditions of Certification **BIO-1** through **BIO-5,** which requires qualified biologists, with authority to implement mitigation measures necessary to prevent impacts to biological resources, be on site during all construction activities. Staff's proposed Condition of Certification **BIO-6** requires the development and implementation of a Worker Environmental Awareness Program to train all workers to avoid impacts to sensitive species and their habitats. Staff's proposed Condition of Certification **BIO-7** requires the project owner to prepare and implement a Biological Resources Mitigation Implementation and Monitoring Plan that incorporates the mitigation and compliance measures required by local, state, and federal LORS regarding biological resources. Staff's proposed Condition of Certification **BIO-8** describes Best Management Practices requirements and other impact avoidance and minimization measures.

Staff's proposed Conditions of Certification **BIO-9** through –**BIO**-**11** are specific to desert tortoise; proposed Condition of Certification **BIO-9** would require installation of security and desert tortoise exclusionary fencing around the entire Project Disturbance Area (including access roads), and **BIO-10** recommends the development and implementation of a desert tortoise translocation plan to move the tortoises currently living in the Project Disturbance Area to identified translocation sites. Staff's proposed **BIO-11** requires verification that all desert tortoise impact avoidance, minimization, and compensation measures have been implemented.

Implementation of staff's proposed Conditions of Certification **BIO-9** and **BIO-10** have inherent risks and could themselves result in direct effects such as mortality, injury, or harassment of desert tortoises due to equipment operation, fence installation activities, removal of tortoise burrows, and tortoise translocation. These impacts are described in more detail below.

<u>Impacts to Critical Habitat</u>

The Project area overlaps with a portion of the 1,020,600-acre Chuckwalla Desert Tortoise Critical Habitat Unit. Critical habitat is defined as the specific areas supporting those physical and biological features that are essential for the conservation of the species and that may require special management considerations or protection (USFWS 2008a). The Project transmission line (2.8 miles), gas line (1 mile) and access road (1.8 miles) would intersect the edge of designated desert tortoise critical habitat (TTEC 2009c). Approximately 23 acres of critical habitat would be directly impacted by construction of these facilities (TTEC 2009c). The Applicant proposed compensation at

a 5:1 ratio for all impacts in critical habitat and/or Desert Wildlife Management Areas. Staff concurs with this recommendation, as described in proposed Condition of Certification **BIO-12**.

Impacts of Relocation/Translocation

Capturing, handling, and relocating desert tortoises from the proposed site after the installation of exclusion fencing could result in harassment and possibly death or injury. Tortoises may die or become injured by capture and relocation if these methods are performed improperly, particularly during extreme temperatures, or if they void their bladders. Averill-Murray (2001) determined that tortoises that voided their bladders during handling had significantly lower overall survival rates (0.81-0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures, pathogens may be spread among the tortoises, both resident and translocated animals. For those tortoise near but not within the Project Disturbance Area, removal of habitat within a tortoise's home range or segregating individuals from their home range with a fence would likely result in displacement stress that could result in loss of health, exposure, increased risk of predation, increased intraspecific competition, and death. Tortoises moved outside their home ranges would likely attempt to return to the area from which they were moved, therefore making it difficult to isolate them from the potential adverse effects associated with Project construction.

The risks and uncertainties of translocation to desert tortoise are well recognized in the desert tortoise scientific community. The Desert Tortoise Recovery Office (DTRO) Science Advisory Committee (SAC) has made the following observation regarding desert tortoise translocations (DTRO 2009, p. 2):

> "*As such, consensus (if not unanimity) exists among the SAC and other meeting participants that translocation is fraught with long-term uncertainties, notwithstanding recent research showing short-term successes, and should not be considered lightly as a management option. When considered, translocation should be part of a strategic population augmentation program, targeted toward depleted populations in areas containing "good" habitat. The SAC recognizes that quantitative measures of habitat quality relative to desert tortoise demographics or population status currently do not exist, and a specific measure of "depleted" (e.g., ratio of dead to live tortoises in surveys of the potential translocation area) was not identified. Augmentations may also be useful to increase less depleted populations if the goal is to obtain a better demographic structure for long-term population persistence. Therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation relative to changes in land use, management, or environmental condition.*"

The Applicant has prepared a draft Desert Tortoise Relocation/Translocation Plan as part of the Incidental Take Permit application (TTEC 2010a) which includes measures to avoid and minimize adverse impacts to resident and translocated desert tortoise. This plan would be reviewed and approved by CDFG, USFWS, and Energy Commission staff, and would be implemented to move any tortoises detected during clearance surveys. The Desert Tortoise Relocation/Translocation Plan includes an analysis to determine whether relocation or translocation is an appropriate action; the identification

and prioritization of potentially suitable locations for translocation; desert tortoise handling and transport considerations (including temperature); animal health considerations; a description of translocation scheduling, site preparation, and management; and specification of monitoring and reporting activities for evaluating success of translocation. With implementation of staff's proposed Condition of Certification **BIO-10**, adverse impacts associated with desert tortoise relocation/translocation would be minimized.

Mitigation for Desert Tortoise Habitat Loss

A significant impact of the Genesis Project is loss of approximately 1,773 acres of desert tortoise habitat, including 23 acres of critical habitat. Fragmentation and disturbance to adjacent desert tortoise habitat contributes to the significance of this impact. Desert tortoise are known to use lower-quality intermountain habitat, such as that present across most of the Project area, as dispersal routes over time, providing connectivity between higher-quality habitat areas (Averill-Murray and Averill-Murray 2005).

In consultation with USFWS and CDFG, staff has concluded that habitat compensation at a 1:1 ratio through land acquisitions or an assessed financial contribution based on the final construction footprint would mitigate for desert tortoise habitat loss within the Project Disturbance Area. This mitigation is consistent with measures in Incidental Take Permits issued by CDFG for projects in the region, and with requirements described in the NECO (BLMCCD 2002). The NECO specifies the following desert tortoise compensation requirements (from page D-2, Appendix D, BLM-CCD 2002):

> "*A mitigation fee based on the amount of acreage disturbed shall be required of proponents of new development. Within Desert Wildlife Management Areas (DWMAs) (Category I) the lands delivered or equivalent fee shall be an amount that achieves a ratio of 5 acres of compensation land for every 1 acre disturbed. Outside DWMAs (Category III) the lands delivered or equivalent fee shall be an amount that achieves a ratio of one 1 acre of compensation land for every 1 acre disturbed. Funds may be expended as approved by the Management Oversight Group in 1991. Lands will be acquired or enhanced within the same recovery unit as the disturbance. CDFG may require additional fees for management of lands and for rehabilitation of lands.*"

In its Incidental Take Permit application (TTEC 2009c) the Applicant described the desert tortoise habitat within the Project Disturbance Area as marginal, and did not recommend mitigation for any desert tortoise habitat loss. Instead the Applicant proposed acquisition of off-site habitat to compensate for possible incidental take of six desert tortoises over the course of construction and operation, as well as compensatory mitigation of impacts to portions of the Desert Wildlife Management Area and critical habitat.Staff, CDFG, and USFWS agree that the Project Disturbance Area does not include any high quality desert tortoise habitat, but all of it is suitable for desert tortoise and all could potentially be occupied by this species. The Project would eliminate desert tortoise habitat, fragment adjacent habitat and adversely affect connectivity for desert tortoise and other wildlife. Staff recommends a mitigation ratio of 1:1 for loss of 1,749 acres of Sonoran creosote bush scrub within the Project Disturbance Area, and a 5:1 ratio for the 23 acres within critical habitat.

As specified in staff's proposed Condition of Certification **BIO-12**, acquisition, protection and enhancement of desert tortoise habitat would mitigate Project impacts to desert tortoise. Acquisition of mitigation lands would focus on parcels in critical habitat within the Chuckwalla DWMA as well as securing lands that would promote protection of high quality desert tortoise habitat between the northern portions of the Chuckwalla DWMA and Joshua Tree National Park (see Appendix B for a regional map depicting these targeted acquisition areas). The location of the mitigation lands would also facilitate connectivity between desert tortoise populations in the Chuckwalla and Chemehuevi DWMAs and critical habitat units.

Staff's proposed Condition of Certification **BIO-12**, Desert Tortoise Compensatory Mitigation, specifies security for acquisition of 1,864 acres and provides an estimate of associated costs. These costs include an acquisition fee of $500 per acre, initial habitat improvement costs at $330 per acre, and long-term management endowment is estimated at $1,450 per acre (Nicol pers. comm.). The estimated composite mitigation cost to meet staff's recommendation for establishing the security would be $2,280 per acre. This security amount may change with an updated appraisal and when a Property Analysis Record is prepared for the parcels that have been selected for acquisition. It is important to note that these are estimates based on current costs; the requirement is defined in terms of acres, not dollars per acre, and actual costs may vary.

Integrating State and Federal Desert Tortoise Mitigation

Staff from BLM, Energy Commission, USFWS, and CDFG agrees that compensatory mitigation at a 1:1 ratio is appropriate for Project impacts to desert tortoise habitat. However, some differences remain between the federal and state approach to desert tortoise mitigation that currently preclude a complete integration of desert tortoise mitigation requirements. One difference is the state requirement for permanent protection of acquired mitigation lands. Energy Commission staff and CDFG require that mitigation lands acquired for endangered species be maintained and protected in-perpetuity for the benefit of those species. The BLM cannot always make the same commitment to protecting acquired mitigation lands because their multiple use mandate restricts their ability to designate lands solely for conservation purposes and to exclude potentially incompatible development and activities.

The REAT Agencies agree that to address the in-perpetuity protection requirement, any lands acquired and subsequently donated to BLM will have either a deed restriction or conservation easement in title that will preclude future development of the land (Fesnock pers. comm., Flint pers. comm.). The REAT Agencies also note that protection could be achieved by buying private in-holdings within designated wilderness or wilderness study areas, being that these areas are congressionally designated and as such preclude any development within them, thus meeting the requirement for in-perpetuity protection. The BLM has an established process for accepting lands with deed restrictions or conservation easements and is working on streamlined version of this process. Staff anticipates that the stream-lined process for in-perpetuity protection of BLM mitigation lands will be established before the end of 2010 (Fesnock pers. comm., Flint pers. comm.).

The BLM has also indicated that for any land enhancement actions or recovery actions implemented on existing BLM-owned lands, BLM would develop a Memorandum of

Understanding (MOU) with CDFG containing provisions for notification of any proposed Projects affecting those lands (BLM 2009a). The BLM agreed that future Projects authorized on these mitigation lands would be compensated at a higher rate (BLM 2009a).

Calculation of Security for Desert Tortoise Compensatory Mitigation

To satisfy section 2081 of the California Endangered Species Act an applicant must provide financial assurances to guarantee that an adequate level of funding is available to implement all impact avoidance, minimization, and compensation measures. These financial assurances are generally provided in the form of an irrevocable letter of credit, a pledged savings account, or another form of security prior to initiating ground-disturbing Project activities. Staff's proposed conditions of certification typically specify the dollar amount of the security, and include a provision for adjusting that security amount when parcel-specific information is available. This security amount is calculated by multiplying the acreage of the impact area by the total per acre costs, a figure which represents the sum of the costs required for: (1) land acquisition, (2) initial habitat improvements, and (3) a long-term maintenance and management fee to support long-term management of the acquired lands.

The latter cost for the long-term management endowment is typically the largest component of the mitigation fee. Interest from the endowment creates a funding source that provides enough income to cover annual stewardship costs on the acquired lands and includes a buffer to offset inflation. The amount for the endowment is established by a Property Analysis Record (PAR), a computerized database methodology developed by the Center for Natural Lands Management (<www.cnlm.org/cms>) which calculates the costs of land management activities for a particular parcel. These activities include development of a desert tortoise management plan tailored for each parcel of mitigation land to assess habitat status, identify desired conditions, and develop plans to achieve conditions that would best support desert tortoise. Once the management plan is developed and approved by the appropriate resource agencies, implementation of enhancement actions such as fencing, road closure, weed control, habitat restoration as well as monitoring can begin. The goal of these activities is to increase the carrying capacity of the acquired lands for desert tortoise and increase their population numbers by enhancing survivorship and reproduction.

Funding for the initial habitat improvements supports those actions needed immediately upon acquisition of the property to secure it and remove hazards. These activities might include fencing or debris clean-up, or other urgent remedial action identified prior to when the parcels were acquired. When the management plan is completed for the acquired parcel activities like these are thereafter funded from the interest produced by the long-term management maintenance fee described above.

Staff's proposed Condition of Certification **BIO-12** specifies acquisition of 1,864 acres and provides an estimate of associated costs. These costs include acquisition fees of $500 per acre, a figure that reflects recent land sale in the Chuckwalla Bench area (Nicol pers. comm.). Initial habitat improvement costs (for example, fencing, debris removal) are estimated at $330 per acre, and long-term maintenance and management is estimated at $1,450 per acre based on a Property Analysis Record prepared for land in the Chuckwalla area (Nicol pers. comm.) The estimated composite mitigation cost to

meet staff's recommendation for establishing the security would be $2,280 per acre. This security amount may change when an updated appraisal is made and a Property Analysis Record is prepared for the parcels that have been selected for acquisition. It is important to note that these are estimates based on current costs; the requirement is defined in terms of acres, not dollars per acre, and actual costs may vary. If the security proves to be inadequate to secure the necessary acreage because of increases in land costs, the project owner would need to make up the difference. Similarly, if the security was an overestimate the project owner would be refunded the excess.

In contrast to the state mitigation approach, the BLM does not require a long-term maintenance and management fee or other funding to manage the acquired desert tortoise mitigation lands because they pursue recovery goals through implementation of region-wide management plans and land use planning as described in the NECO and the Desert Tortoise Recovery Plan rather than through parcel by parcel acquisitions and management. The BLM typically requires a cash payment (proffer) prior to initiating ground-disturbing activities, which generally includes a per acre cost reflecting current land value and recent purchase prices, as well as additional acquisition and indirect costs and funding for appraisals, environmental site assessments, property cleanup, and an inflation contingency. However, as noted by the REAT agencies, other methods may be employed which would satisfy both BLM and the state agency legal requirements.

Indirect Impacts

Ravens and Other Predators

Construction and operations activities associated with the Genesis Project could provide food or other attractants in the form of trash, road-killed animals, and water, which would draw unnaturally high numbers of desert tortoise predators such as the common raven, kit fox, and coyote to the Project area. Project structures would also provide new nesting and perching sites for ravens such as new transmission line towers and perimeter fencing. Development of new elevated perching sites as a result of Project construction could increase raven numbers locally, including the probability that young ravens remain in the area after maturing, which, in turn, could result in increased predation on desert tortoise in the vicinity of the Project Disturbance Area.

Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990, USFWS 2008a) and one of many anthropogenic contributors to desert tortoise population declines.

In addition to ravens, feral dogs have emerged as major predators of the tortoise. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 1994; Evans 2001). Dogs brought to the Project site with visitors may harass, injure, or kill desert tortoises, particularly if allowed off leash to roam freely in occupied desert tortoise habitat. The worker environmental awareness training (**BIO-6**) and restrictions on pets being brought to the site required of all personnel (**BIO-8**) would reduce or eliminate the potential for these impacts.

Construction and operation of the Genesis Project would increase raven and coyote presence in the Project area. Ravens capitalize on human encroachment and expand into areas where they were previously absent or in low abundance. Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources that are introduced or augmented by human encroachment. Road kill along I-10 provides an additional attractant and subsidy for opportunistic predators/scavengers such as ravens. Road kills would mount with increased Genesis Project construction and operations traffic, further exacerbating the raven/predator attractions and increasing desert tortoise predation levels. Staff's proposed Condition of Certification **BIO-8** provides measures to minimize the number of road-kill that might attract desert tortoise predators.

Regional Approach to Raven Control

The USFWS has developed a comprehensive, regional raven management and monitoring program in the California Desert Conservation Area to address the regional, significant threat that increased numbers of common ravens pose to desert tortoise recovery efforts (USFWS 2010). The Regional Raven Management Program will implement recommendations in the USFWS E*nvironmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (USFWS 2008). To mitigate the Genesis Project's contribution to cumulative and indirect impacts on desert tortoise from raven predation, staff proposes that the applicant contribute toward implementation of the USFWS Regional Raven Management Program (USFWS 2010), as described in Condition of Certification **BIO-13**. The applicant's payment would support the regional raven management plan activities focused within the Colorado Desert Recovery Unit, which would be adversely affected by increases in raven subsidies attributable to the proposed Project. The fees contributed by the Applicant would fund staff who would implement the raven removal actions, education and outreach efforts, and surveying and monitoring activities identified in the Environmental Assessment (USFWS 2008). Staff has concluded that that implementation of these actions would be an effective means of reducing the Project's cumulative contributions to desert tortoise predation from increased raven numbers.

The draft Common Raven Monitoring, Management and Control Plan (TTEC 2010k) includes methods and best management practices to avoid and minimize raven attractants and subsidies on the project site, and these methods and practices have been incorporated into staff's proposed Condition of Certification **BIO-13**. The Applicant's Common Raven Monitoring, Management and Control Plan would involve identifying and preventing conditions that might attract or support ravens (for example, eliminating food sources such as garbage or roadkill, minimizing creation of structures that could provide ravens perches, nests or roosts), monitoring the effectiveness of raven management and control measures, and then implementing additional adaptive management measures to make sure that the Project does not result in an increase in raven numbers. Implementation of measures in **BIO-13** would avoid or minimize the contributions of the Project to increased desert tortoise predation from ravens to less than significant levels.

Increased Risk from Roads/Traffic

Vehicle traffic would increase as a result of construction and improvement of access roads, increasing the risk of injuring or killing desert tortoise. The potential for increased traffic-related tortoise mortality is greatest along paved roads where vehicle frequency and speed is greatest though tortoises on dirt roads may also be affected depending on vehicle frequency and speed. Census data indicate that desert tortoise numbers decline as vehicle use increases and that tortoise sign increases with increased distance from roads (Nicholson 1978; Hoff and Marlow 2002). Additional unauthorized impacts that may occur from casual use of the access roads in the Project area include unauthorized trail creation.

To minimize the risks of increased traffic fatality and other hazards associated with roads at the Genesis Project site, the Applicant has proposed a variety of minimization measures which staff has incorporated into staff's proposed Condition of Certification **BIO-8**. These measures include confining vehicular traffic to and from the Project site to existing routes of travel, prohibiting cross country vehicle and equipment use outside designated work areas, and imposing a speed limit of 25 miles per hour.

Impacts to Wildlife from Noxious Weeds

Sahara mustard (*Brassica tournefortii*) is regarded as one of the most invasive wildland pest plants in the Colorado and Mojave deserts, one of the most common invasive plants in desert tortoise habitat, and capable of dominating entire desert landscapes if no control actions are taken. Left uncontrolled, it out-competes and ultimately replaces native wildflowers that provide valuable forage for the desert tortoise. It forms dense thickets that can increase the frequency, intensity, and size of desert fires, increasing the threat to native plant communities, the desert tortoise, and other wildlife (Brooks 2010). In areas where Sahara mustard is particularly dense it may also impede desert tortoise movement (Berry pers. comm.). In the Colorado and Mojave Deserts, a single tortoise was necropsied that had died from renal failure, related to renal oxalosis, and the crystals present in the kidneys were identified as oxalates (Jacobson et al. 2009). One additional tortoise was later necropsied that died of oxalosis in the same region (Berry pers comm. 2010). Although many native plants in the Mojave and Colorado deserts contain oxalates, the oxalate-containing weed Sahara mustard is one of the most common invasives in desert tortoise habitat and is a suspected cause of the renal failure (Berry pers comm).

Sahara mustard spreads explosively during wet years but even during a 12-year drought in Riverside County (1989-1991), the population of Sahara mustard increased by nearly 35 times. Densities equivalent to as high as three million plants per acre have been recorded at Lake Mead National Recreation Area (Graham et al. 2003).

The spread of Sahara mustard from increased vehicle use of the area roads and from transmission construction (Berry pers comm)—its primary conduit for spread—mayaffect Mojave fringe-toed lizard and other wildlife by altering the availability of forage plants and characteristics of their habitat structure. For example, the Coachella Valley fringe-toed lizard (*Uma inornata*) is a dune-dependent species that requires fine, loose, windblown (aeolian) sand for survival (Zeiner et al. 1990). Much of the ephemeral sand field community within the Coachella Valley has become increasingly less fine and

more gravelly over the past 25 years while there has also been a decline in Coachella Valley fringe-toed lizard populations over the past two decades (Barrows et al. 2010). Barrows et al. (2009) found the Coachella Valley fringe-toed lizard to be the only animal species of five vertebrates evaluated to demonstrate a negative response to Sahara mustard abundance.

Other Indirect Impacts

In addition to construction-related introduction of invasive plants that out compete native plants, other indirect impacts to desert tortoise could result from an increased incidence of accidental wildfires. This could be caused by construction or downed new transmission wires, but the potential for this is low due to the relatively small length of transmission lines proposed as part of the Project. With the addition of hundreds of new jobs, there will be an increased use of area roads that can increase the risk of ignition on roadsides. Both of these impacts could reduce adjacent habitat quality for desert tortoise. Potential deposition of sediment loads as a result of construction-related sediment mobilization during heavy rain events and flooding downstream would impact existing desert tortoise burrows outside of the Project Disturbance Area.

Conclusion – Impacts and Mitigation for Desert Tortoise

Staff's proposed Conditions of Certification **BIO-6** through **BIO-11** describe measures that would avoid and minimize direct impacts to desert tortoise and other sensitive biological resources, and staff has concluded that implementation of these measures would reduce potential direct impacts to less than significant levels. To address the loss of 1,773 acres of desert tortoise habitat, including impacts to 23 acres of critical habitat, and associated fragmentation and loss of connectivity, staff's proposed Condition of Certification **BIO-12** requires acquisition and enhancement of 1,864 acres of desert tortoise habitat within the Colorado Desert Recovery Unit. Staff recommends a 5:1 compensatory mitigation ratio for impacts to desert tortoise critical habitat, and 1:1 for the 1,749 acres of Sonoran creosote bush scrub within the Project Disturbance Area. The compensatory mitigation acquisitions must be in areas that have potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise populations. Staff has concluded that these mitigation measures would reduce impacts to desert tortoise to less than significant levels.

Couch's Spadefoot Toad

Couch's spadefoot toads were recorded breeding in a pond south of I-10 near Wiley Well Road (Dimmitt 1977) that apparently overlaps with the Project's proposed transmission line corridor; in the absence of survey information indicating otherwise, staff considers this species to be extant at this location. Couch's spadefoot toads require aquatic habitat for breeding and upland habitat for burrowing. This species does not breed every year, and therefore potential breeding habitat does not necessarily need to sustain surface water for an extended period of time (minimum approximately 9 days) every year. Burrowing habitat is considered any area with friable soil within the adult or juvenile dispersal distance for this species. This dispersal distance is largely unknown, though there is one record from Mayhew (1965) of a juvenile 0.25 miles from the closest breeding pond. Therefore, in the absence of more conclusive information, upland Couch's spadefoot toad habitat is considered to be all areas with friable soils within 0.25 miles of a potential breeding pond and other observations place them at

least one mile from ponds (Dimmitt, pers. comm.). While little is known about the location and proximity of subterranean refuge sites, there is some indication that they are widely distributed and that breeding pond habitat is the limiting factor in their distribution (Dimmitt, pers. comm.).

Impacts to Couch's spadefoot toads could include loss of breeding habitat and direct mortality during grading or construction. Disturbance to breeding ponds, including new ponds incidentally created during construction activities, could also impact this species. In addition, construction, maintenance, and operation traffic could result in direct mortality on Project area roads. Indirect impacts could result from hydrology changes that reduce flow to breeding areas. In addition, construction noise could trigger emergence when conditions are not favorable. As discussed above, the Project transmission line corridor overlaps a recorded breeding site. While the exact location of the breeding pond is unknown, a review of aerial photos and a site visit identified a pond southwest of the intersection of Wiley Well Road and I-10 the area mapped in Dimmitt (1977). In addition, staff has reviewed aerial photos of the linear route and solar facility site north of I-10. Staff agrees with the Applicant that it is unlikely the solar facility site supports breeding pond habitat thought it may provide habitat for subterranean burrows if there is a breeding pond within dispersal distance. Staff has identified areas along the linear route, however, that need further study to determine whether these areas are capable of sustaining surface water and therefore provide breeding habitat.

Without species-specific survey results and with limited occurrence information, it is difficult to assess the potential for direct and indirect impacts to Couch's spadefoot toads. However, based on a known occurrence in the Project area, and surface water visible in Project aerials and verified in the field, staff concludes that the pond southwest of Wiley Well Road and I-10 is breeding habitat for Couch's spadefoot toad. Further, based on a review of aerial photography staff believes that additional breeding habitat for this species may occur north of I-10 along the proposed linear facility route.

The Genesis Project is located at the western border of the Couch's spadefoot toad range. Staff considers the impacts to one of the few known breeding ponds for this species at the western boundary of its range to be a significant impact. Staff's proposed Condition of Certification **BIO-27** requires development and implementation of a Couch's Spadefoot Toad Protection and Mitigation Plan, which requires avoiding impacts to all spadefoot toad breeding habitat along the Project linear corridors, or requires construction of replacement habitat if impacts are unavoidable. In order to complete this plan, habitat surveys in 2010 would be required to identify potential spadefoot toad breeding habitat along the linear alignment. Staff will work with the Applicant to develop the appropriate survey methods and gain appropriate approvals prior to survey initiation from agency staff. Elements to consider in developing the survey methods would include a discussion of available food sources, identifying potential breeding pond characteristics, and an appropriate buffer to protect these potential breeding sites.

Staff anticipates that construction activities could avoid the known breeding pond south of I-10 near Wiley Well Road. The Protection and Mitigation Plan would provide detailed guidance to implement the protection of the I-10 pond during Project construction and operation, and would extend that protection to any other ponds detected during habitat

surveys conducted north of I-10 along the linear corridor. Staff's proposed Condition of Certification **BIO-27** also requires that the new breeding pond habitat be created if ponds are impacted during construction. The avoidance, minimization and compensatory mitigation described in **BIO-27** would reduce Project impacts to Couch's spadefoot toad to less than significant levels.

Western Burrowing Owl

The 2009 biological field surveys indicated two burrowing owls were present within the Study area and burrowing owl sign (burrows, whitewash, feathers, and pellets) was observed at several locations throughout the Study area (GSEP 2009a, Appendix C). However, the 2009 surveys did not reveal the presence of burrowing owls or active burrows within in the Project Disturbance Area. Since owls and owl sign were found just outside of the Project Disturbance Area, staff has concluded that there is some potential for burrowing owls to move into Project site to nest, and therefore could be directly impacted. In addition, burrowing owls near but not within construction areas could be impacted during construction activities. The potential for direct impacts to burrowing owl includes the loss of nest sites, eggs, and/or young (unless the birds are evicted prior to construction); permanent loss of breeding and foraging habitat; and disturbance of nesting and foraging activities for burrowing owl pairs within the Project site, buffer, or immediately surrounding area. Indirect impacts to burrowing owls during construction and operation can include increased road kill hazards, modifications to foraging and breeding activities, and loss of prey items and food sources due to a decreased number of fossorial mammals.

If burrowing owls were detected nesting within the Project Disturbance Area, they would need to be relocated prior to the nesting season to avoid direct impacts. There is much debate among state, federal, local, and private entities over the most practicable and successful relocation/translocation methods for burrowing owl. When passive relocation is used solely as an impact avoidance measure, it is generally only effective when burrowing owl nesting territories are directly adjacent to permanently protected lands (i.e. military reservation, airport, wildlife reserve, agricultural reserve with appropriate crop type such as alfalfa) (Bloom 2003). Passive relocation has been criticized as a relocation method because relocated or displaced owls are tenacious about returning to their familiar burrows and are inclined to move back to the impact site if the impact site is still visible to the owl and/or if the impact site is not completely graded (Bloom pers. comm.). Burrowing owls are put at increased risk when they are introduced to a new environment. The owls are naturally preyed upon by numerous diurnal and nocturnal avian and mammalian species and evicting owls from their familiar burrow, territory, and home range without a safe opportunity to become familiar with their new habitat increases the potential for predation (Pagel pers. comm.). Thus, many burrowing owls likely die during passive relocations used for permanent owl eviction.

For successful active or passive relocation, breaking the owl's site fidelity is of utmost importance (Bloom 2003). The off-site location for the relocated owls should ideally have an existing burrowing owl colony and a large ground squirrel colony. Should neither colony already exist at the translocation site, artificial burrows should be installed if significant grassland or appropriate agricultural crop type is present (Bloom 2003). Active translocation of owls involves trapping owls, temporarily holding them in

enclosures with supplemental feeding, and releasing at a suitable off-site location with existing or artificial burrows prior to breeding.

While active translocation might be a better solution than passive relocation for moving owls from large sites like the Genesis Project site, California Fish and Game Code 3503.3 prohibits the active relocation of burrowing owls unless the effort is designed as a research project. Staff therefore recommends implementation of passive relocation if burrowing owls are detected within the Project Disturbance Area and need to be relocated to avoid direct impacts. Staff requests that the applicant coordinate with CDFG on the approval of the color-banding of any burrowing owls to be passively relocated (in accordance with the guidance provided by USGS bird banding lab (http://www.pwrc.usgs.gov/bbl) in order to document the success of the burrowing owl relocation and monitoring program. Staff would also support a cooperative research effort with the Applicant, CDFG and USFWS to develop a research protocol to assess the efficacy of an active translocation program., The California Burrowing Owl Consortium (CBOC 1993) guidelines state that offsite suitable habitat for use by burrowing owl must be acquired at one of the following ratios:

- Replacement of occupied habitat with occupied habitat at 9.75 acres (6.5 acres times 1.5 acres) per pair or single bird;
- Replacement of occupied habitat with habitat contiguous to currently occupied habitat at 13.0 (6.5 acres times 2) acres per single pair or single bird, or;
- Replacement of occupied habitat with suitable unoccupied habitat at 19.5 (6.5 acres times 3) acres per pair or single bird.

The USFWS notes that the above guidelines were developed for owls nesting in coastal habitats, and their efficacy in desert environments has not been ascertained (Sorenson pers. comm.). No documentation is available to statistically evaluate the success of passive relocation in southern California. Passive relocations in Western Riverside County have not involved banded birds, so information on rates of success and direct/indirect mortality are not available. Reports elsewhere (Trulio 1995; 1997) do not provide long term analyses associated with passive relocation efforts to determine if passively relocated burrowing owls are present in the area after one or more years. The lack of documented success of passive translocations raises concerns regarding the fate of evicted owls.

Acquisition of the appropriate amount of offsite habitat for burrowing owl should take into consideration the number of owls being displaced as a result of the Project, the amount of foraging habitat being impacted by the Project, and the average home ranges and foraging distances of breeding and non-breeding owls. Diurnal home range for owls can be 150 feet on both sides of burrow. Nocturnal home range is much larger, 1 square mile per owl pair, and several owls can overlap in that 1 square mile (Bloom pers. comm.). The mean home range for 11 male burrowing owls in 1998 and 22 males in 1999 was 177 ha (437 acres) and 189 hectares (467 acres), respectively, at naval Air Station in Lemoore, California which is located south of Fresno (Bloom 2003). Male burrowing owls often move greater than 1,000 meters when foraging in the breeding season and home ranges can often times overlap (Bloom 2003).

Staff has concluded that while no burrowing owls were detected in the Project Disturbance Area during the 2009 surveys, they could be found there when construction occurs because they have been recorded nearby. Staff has proposed Condition of Certification **BIO-18** (Burrowing Owl Impact Avoidance and Minimization Measures) which requires a pre-construction survey to determine the current number of owls occupying the Project Disturbance Area and surrounding buffer area. **BIO-18** recommends avoidance and minimization measures to protect owls nesting near but not within the Project Disturbance Area. In addition, staff has conservatively assumed that one burrowing owl pair might occur within the Project, and has required acquisition of up to 19.5 acres per owl acres of compensatory mitigation to offset the loss of habitat if pre-construction surveys indicate that owls are using the Project site for breeding. If no burrowing owls are detected nesting within the Project Disturbance Area during pre-construction surveys, then the recommendation for acquisition of 19.5 acres per owl of burrowing owl habitat would not apply. With implementation of **BIO-18,** direct and indirect impacts to burrowing owls resulting from construction of the Project would be mitigated to less than significant levels through pre-construction surveys and acquisition of compensatory habitat if it is determined that owls will be displaced as a result of construction following surveys.

Golden Eagle

Golden eagles can be extremely susceptible to disturbance during the breeding season (Anderson et al. 1990; USFWS 2009b), and adverse effects are possible from various human activities up to (and in some cases exceeding) one mile from a nest site (Whitfield et al. 2008). While golden eagles are known to occur in the region, there are no known nests within 14 miles of the Project site (BLM 1999) and this species was not incidentally observed during avian point count surveys or field surveys conducted for other plant and wildlife species (GSEP 2009a). Golden eagle inventories are currently being conducted using methods recommended by USFWS (Pagel et al. 2010) and will cover all potential nesting habitat within 10 miles of the Project boundaries.

Without Project-specific survey results, staff made a general evaluation of the potential for the Project to injure or disturb breeding or wintering golden eagles with the assumption that an active golden eagle territory might occur within 10 miles of the Project boundaries.

Based on guidance provided by the USFWS (72 FR 31132, June 5, 2007) staff defined disturbance as an activity that would result in injury to an eagle or which would substantially interfere with normal breeding, feeding, or sheltering behavior. For example, a nestling being knocked from the nest by a startled adult would be considered an injury. A nestling fed inadequately because adults were agitated in the vicinity of the nest due to construction-related noise and activity would also be considered substantial interference, as would a situation in which nestlings starve because the adults were excluded from their familiar foraging grounds and could not provide adequate food to their young.

Staff concluded that Project construction activities could potentially injure or disturb golden eagles if nests were established sufficiently close to Project boundaries to be affected by the sights and sounds of construction. Staff considers these potential impacts unlikely, but if active golden eagle were established within 10 miles of the

Project boundaries, disturbance to nesting activities would be avoided with implementation of Condition of Certification **BIO-28** (Golden Eagle Inventory and Monitoring). This condition recommends that during construction, golden eagle nest surveys be conducted in accordance with USFWS guidelines to verify the status of golden eagle nesting territories within 10 miles of the project boundaries. If active nests are detected, **BIO-28** recommends monitoring guidelines, performance standards, and adaptive management measures to avoid adverse impacts to golden eagles from Project construction. Implementation of **BIO-28** would reduce potential impacts of Project construction on nesting golden eagles to less than significant levels.

Staff also assessed the impacts of the Project to golden eagle foraging habitat, and concluded that this Project would contribute to the cumulative loss of golden eagle foraging habitat within the NECO planning area. The Project would reduce the availability of foraging habitat in the Project area and could degrade foraging habitat by the introduction and spread of noxious weeds and an increase in human activity in the area. As discussed in the cumulative impact subsection, the Project contributes 0.7 percent to cumulative loss of Sonoran creosote bush scrub habitat within 10-miles of potential nest habitat from future projects (see **Biological Resources Table 15**). The potential for impacts to golden eagle foraging habitat can be minimized by the implementation of staff's proposed Conditions of Certification **BIO-12** (acquisition of desert tortoise compensatory mitigation lands), **BIO-22** (acquisition of state waters compensatory mitigation lands) **BIO-14** (implementation of Weed Management Plan). As described in **BIO-12**, the acquisition of desert tortoise mitigation lands would be targeted for areas within and near the Chuckwalla Bench and the Chuckwalla DWMA. Because these targeted areas are also within 10 miles of potential nesting sites for golden eagles, acquisition of these desert tortoise mitigation lands would also provide protected golden eagle foraging grounds.

Migratory/Special-status Bird Species

Several special-status species, such as black-tailed gnatcatchers, yellow warblers, and crissal thrashers, breed in the region, but would not breed on the site due to lack of suitable habitat. This region does not provide breeding habitat for Swainson's hawks, northern harriers, short-eared owls, ferruginous hawks, or Brewer's sparrows but may provide overwintering habitat or the species may be present during migration. The Project impacts to Sonoran creosote bush scrub and microphyll woodland would contribute to loss of foraging habitat, cover, and roost sites for these species on their migratory or wintering grounds, but would not contribute to loss of breeding habitat. The Project would have more substantial adverse effects to the resident breeding birds at the site, which include loggerhead shrike, California horned lark, and Le Conte's thrasher among others. These species would be adversely affected by the loss of 16 acres of microphyll woodland and 1,773 acres of Sonoran creosote bush scrub. Le Conte's thrasher, loggerhead shrikes and other wash-dependent species would in particular be affected by the loss of the cover, foraging and nesting opportunities provided by the structurally diverse and relatively lush dry washes and microphyll woodland. Dry washes contain less than five percent of the Sonoran Desert's area, but are estimated to support ninety percent of Sonoran Desert birdlife (CalPIF 2006). As discussed in the cumulative impact subsection, staff considers the Genesis Project to be a substantial contributor to the cumulative loss of the NECO Planning Area's

biological resources, including habitat for these special-status birds. Staff's proposed Condition of Certification **BIO-12**, the desert tortoise compensatory mitigation plan and **BIO-22**, mitigation for impacts to state waters, would offset the cumulative loss of habitat for these species.

The loss of active bird nests or young is regulated by the federal Migratory Bird Treaty Act and Fish and Game Code section 3503, which protects active nests or eggs of California birds. The Applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into staff's proposed Conditions of Certification including: **BIO-8** (Impact Avoidance and Minimization Measures); **BIO-15** (Pre-construction Nest Surveys); which describes guidelines for performing pre-construction surveys and **BIO-16** (Avian Protection Plan) which provides a mechanism to monitor for bird collisions and implement adaptive management measures to minimize impacts. Implementation of staff's proposed conditions of certification would avoid direct impacts to nests, eggs, or young of migratory birds, and would minimize the impacts to less than CEQA significant levels for construction disturbance to resident and migratory birds.

Bats

The Project site supports foraging and roosting habitat for several special-status bat species. Roosting opportunities for bats are available in tree cavities, soil crevices and rock outcroppings primarily within dry desert wash woodland habitats. Bats likely utilize habitats throughout the study area for foraging but forage more commonly when water is present within the desert washes when insects are more abundant. Implementation of the Project would result in loss of these foraging and roosting habitat opportunities for special-status bats that might occur in the Project area.

As discussed in the cumulative impact subsection, staff considers the Genesis Project to be a substantial contributor to the cumulative loss of in the NECO Planning Area's biological resources, including habitat for these special-status bats. Staff's proposed Condition of Certification **BIO-12**, the desert tortoise compensatory mitigation plan and **BIO-22**, mitigation for impacts to state waters, would offset the cumulative loss of habitat for these species.

American Badger and Desert Kit Fox

Construction of the Project could kill or injure American badgers by crushing with heavy equipment or could entomb them within a den. Construction activities could also result in disturbance or harassment of individuals. Like badgers, desert kit fox are burrow dwellers and are similarly at risk of death or injury from construction activities. The desert kit fox is not a special-status species, but it is protected under Title 14, California Code of Regulations (section 460), and potential impacts to individuals of this species must be avoided. Badger burrows and kit fox burrow complexes were detected within the Project Disturbance Area, and the site includes suitable foraging and denning habitat for these species. Construction activities could also result in disturbance or harassment of individuals. Staff's proposed Condition of Certification **BIO-17** requires that concurrent with the desert tortoise clearance survey, a qualified biologist perform a preconstruction survey for kit fox dens and American badgers in the Project area, including areas within 250 feet of all Project facilities, utility corridors, and access roads.

The Genesis Project would permanently remove approximately 1,811 acres of foraging and denning habitat for American badgers and kit foxes and would fragment and reduce the value of foraging and denning habitat adjacent to the Project site. This habitat loss and degradation could adversely affect American badger and kit fox populations within the NECO Planning Area. As discussed in the cumulative impact subsection, staff considers the Genesis Project to be a substantial contributor to the cumulative loss of the NECO Planning Area biological resources, including American badgers and kit fox. Staff's proposed Condition of Certification **BIO-12**, the desert tortoise compensatory mitigation plan, and **BIO-22**, compensatory mitigation for state waters, could offset the loss of habitat for this species and reduce the impact to less-than-significant.

Nelson's Bighorn Sheep

The Project site is south of a bighorn sheep connectivity corridor between the Palen and McCoy Mountains, identified in the NECO (BLM CDD 2002). However because the distance from the mountain ranges, and the width of the valley at the Project site, staff agrees with the Applicant that the Project site is not expected to be an important movement corridor for this species. The Society for Conservation of Bighorn Sheep has recommended a one mile buffer from the upper edge of any solar development to the base of the mountains to protect spring foraging habitat. The Genesis Project site is over one mile from the base of either the McCoy Mountains or Palen Mountains, and the Project site is not expected to provide spring foraging habitat.

Also of interest are the potential impacts from Project groundwater extraction to seeps, springs, or other water resources that are currently available to bighorn sheep that occupy the Palen Mountains or could occupy the McCoy Mountains in the future. The Applicant has provided information (GSEP 2009f) about the closest water features, and has concluded that groundwater extraction for the Project would not affect these features. After reviewing the data provided in the Data Responses, staff agrees with the Applicant that the Project is unlikely to affect springs and seeps available for use by bighorn sheep.

As discussed in the Cumulative Impact subsection C.2.9, the Genesis Project would not directly affect habitat within any NECO connectivity corridors and would not conflict with Desert Bighorn Sheep Conservation goals and objectives outlined in the NECO. In addition, staff has concluded that the Genesis Project site does not represent significant direct or indirect impacts to bighorn sheep habitat connectivity or foraging. Bighorn sheep may be impacted by construction noise, as discussed in the Construction Noise subsection below.

Construction Noise

Construction activities would result in a temporary, although relatively long-term (37 months) increase in the ambient noise level. Animals rely on hearing to avoid predators, obtain food, and communicate. Excessive construction noise could interfere with normal communication, potentially interfering with maintenance of contact between mated birds, obscuring warning and distress calls that signify predators and other threats, and affecting feeding behavior and protection of the young. High noise levels may also render an otherwise suitable nesting area unsuitable. Behavioral and physiological responses to noise and vibration have the potential to cause injury, energy loss (from

movement away from noise source), a decrease in food intake, habitat avoidance and abandonment, and reproductive losses (Hunsaker 2001; National Park Service 1994).

The Palen/McCoy Wilderness Area, immediately north of the proposed Project, and a bighorn sheep Wildlife Habitat Management Area (WHMA), approximately four miles north of the proposed Project, are especially sensitive noise receptors due to the presence of breeding wildlife (e.g., migratory birds and Nelson's bighorn sheep). Sensitive bird nesting habitat also occurs in the adjacent creosote bush scrub to the south and east of the Project site as well as in the desert dry wash woodland approximately one mile east of the Project site. Studies have shown that noise levels over 60 A-weighted decibels (dBA) can result in nest abandonment by birds and intense, long-lasting noise can mask bird calls, which can reduce reproductive success (Dooling and Popper 2007; Hunsaker 2001). Noise impact studies on bighorn sheep have not identified numerical noise impact thresholds. Weisenberger et al. (1996) found that bighorn sheep responded to aircraft over-flights (92-112 dBA) with increased heart rates and altered behavior; however, animal response decreased with increased exposure.

Assuming an average construction noise of 93 dBA at 50 feet from the noise center (the upper range of noise levels for construction equipment), project construction noise would attenuate to 30 dBA at a distance of five miles from the noise center (GSEP 2009a). Using sound extrapolation, project construction noise should attenuate to 60 dBA at approximately 2,300 feet (0.43 mile) from the noise center of construction activities (Bright pers. comm.). The loudest proposed construction activity would be the steam blows required to prepare a steam turbine for startup during the final phase before operation. This process cleans the piping and tubing which carry steam to the turbines; starting the turbines without cleaning these systems would destroy the turbine. A continuous low-pressure technique would be used for steam blows, which would release steam over a continuous period of about 36 hours and would result in noise levels of about 80 dBA at 100 feet. Another relatively loud and short-term construction activity is pile driving. If required, noise from this activity could be expected to reach 101 dBA at a distance of 50 feet and attenuate to 47 dBA at distance of five miles from the project site.

The majority of the construction activities would occur within the powerblocks located approximately 3,200 feet (0.6 mile) from the project boundary. Therefore, it is anticipated that construction noise levels would typically be less than 60 dBA in the Palen/McCoy Wilderness Area and surrounding the project site. The infrequent occasions when construction activities would occur near the project boundary and resultant noise levels would be temporarily elevated beyond 60 dBA surrounding the project would not significantly impact sensitive wildlife.

For a complete analysis of construction noise impacts, refer to the **Noise** section.

Noxious Weed Spread Due to Construction and Increased Vehicle Traffic

Construction activities and soil disturbance could introduce new noxious weeds to lands adjacent to the Genesis Project plant site and its linear facilities, and could further spread weeds already present in the Project vicinity. The spread of invasive plants is a major threat to biological resources in the Colorado Desert because non-native plants

can displace native plants, increase the threat of wildfire, and supplant wildlife foods that are important to herbivorous species. Vehicles are the primary conduit for the spread of many invasive weeds, including Sahara mustard. (*Brassica tournefortii*). It is also spread along transmission corridors, due to a combination of soil disturbance during construction, road construction and maintenance, and increased vehicle use in previously inacessible areas.

Sahara mustard is regarded as one of the most invasive wildland pest plants in the Colorado and Mojave deserts, one of the most common invasive plants in desert tortoise habitat, and capable of dominating entire desert landscapes if no control actions are taken. Left uncontrolled, it out-competes and ultimately replaces native wildflowers that provide valuable forage for the desert tortoise. It forms dense thickets that can increase the frequency, intensity, and size of desert fires, increasing the threat to native plant communities, the desert tortoise, and other wildlife (Brooks 2010). In areas where Sahara mustard is particularly dense it may also impede desert tortoise movement (Berry pers. comm.). In the Colorado and Mojave Deserts, a single tortoise was necropsied that had died from renal failure, related to renal oxalosis, and the crystals present in the kidneys were identified as oxalates (Jacobson et al. 2009). One additional tortoise was later necropsied that died of oxalosis in the same region (Berry pers comm. 2010). Although many native plants in the Mojave and Colorado deserts contain oxalates, however, the oxalate-containing weed Sahara mustard is one of the most common invasives in desert tortoise habitat and is a suspected cause of the renal failure (Berry pers comm).

Salt cedar, Russian thistle, Sahara mustard, and Mediterranean grass are already present in the Project vicinity and are expected to increase as a result of construction- and operation-related disturbance. The proliferation of these and other non-native species has dramatically increased the fuel load and frequency of fire in many desert ecosystems (Lovich & Bainbridge 1999). Unlike other ecosystems in California, fire was not an important part of the Colorado Desert ecosystems and most perennials are poorly adapted to even low-intensity fires, and the animals that coevolved are not likely to respond favorably to fire either. The potential spread or proliferation of non-native annual grasses, combined with the proximity to ignition sources could potentially increase the risk of fire, and the effects to these poor-adapted desert communities would be harmful, particularly to cacti and most native shrubs species. Burned creosote bush and other native shrubs are typically replaced by short-lived perennials and non-native grasses (Brown & Minnich 1986).

To avoid and minimize the spread of existing weeds and the introduction of new ones, an active weed management strategy and control methods must be implemented. The Applicant has submitted a draft Weed Management Plan (TTEC 2010g) to avoid and minimize the spread of noxious weeds. Staff has incorporated recommendations from the Applicant into proposed Condition of Certification **BIO-14** (Weed Management Plan). The Weed Management Plan includes a discussion of weeds targeted for eradication or control and a variety of weed prevention measures such as establishing weed wash stations for construction vehicles and revegetation of disturbed areas with native seed mix. The final plan shall only include weed control measures for target weeds with a demonstrated record of success, based on the best available information

from The Nature Conservancy's The Global Invasive Species Team, California Invasive Plant Council, and the California Department of Food & Agriculture Encycloweedia.

To ensure that weed management does not have unintended adverse effects on special-status species (or their pollinators), **BIO-14** includes guidelines that the final Weed Management Plan must include detailed specifications for safe use of herbicides in natural areas consistent with avoiding herbicide and soil stabilizer drift, consistent with The Nature Conservancy guidelines, available online: http://www.invasive.org/gist/products/library/herbsafe.pdf . The methods used must meet the following criteria:

1. Manual: well-timed removal of plants or seed heads with hand tools; seed heads and plants must be disposed of in accordance with guidelines from the Riverside County Agricultural Commissioner.

2. Chemical: Herbicides known to have residual toxicity, such as pre-emergents and pellts, shall not be used in natural areas or within the engineered channels. Only the following application methods may be used: wick (wiping onto leaves); inner bark injection; cut stump; frill or hack & squirt (into cuts in the trunk); basal bark girdling; foliar spot spraying with backpack sprayers or pump sprayers at low pressure or with a shield attachment to control drift, and only on windless days, or with a squeeze bottle for small infestations (see Nature Conservancy guidelines described above);

3. Biological. Biological methods may be used subject to review and approval by CDFG and USFWS and only if approved for such use by CDFA, and are either locally native species or have no demonstrated threat of naturalizing or hybridizing with native species;

4. Mechanical: disking, tilling, and mechanical mowers or other heavy equipment shall not be employed in natural areas but hand weed trimmers (electric or gas-powered) may be used. Mechanical trimmers shall not be used during periods of high fire risk and shall only be used with implementation of fire prevention measures (GSEP 2009a).

Staff believes that implementation of **BIO-14** would reduce potential impacts from introduction and spread of noxious weeds to less than significant levels under CEQA.

Construction Impacts of Dust on Plants

Disturbance of the soil's surface caused by construction traffic and other activities would result in increased wind erosion of the soil. Aeolian transport of dust and sand can result in the degradation of soil and vegetation over a widening area (Okin et al. 2001). Dust can have deleterious physiological effects on plants and may affect their productivity and nutritional qualities. The destruction of plants and soil crusts by windblown sand and dust exacerbates the erosion of the soil and accelerates the loss of nutrients (Okin et al. 2001). Soil erosion from construction activities and vehicle activity, which affects vegetation and soil properties, could have an adverse effect on both foraging and burrowing potential for Mojave fringe-toed lizards. The impacts of increased dust and other construction impacts can be minimized with implementation of staff's proposed Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures). This

condition includes measures to limit areas subject to disturbance, erosion control measures, and vehicular speed limits, all of which would help minimize dust associated with construction and operation of the Project.

Additional Operation Impacts

Operation Lighting

Collision hazards at the Genesis Project site would include several ancillary buildings (e.g., water treatment building, administration building, control room, steam turbine generator building) that range in height from 30 to 50 feet. The structures would be located within the power block, approximately in the center of each solar field and surrounded by solar arrays. The solar collection assemblies would vary in height depending on their position while tracking the sun; the tallest configuration would be approximately 25 feet tall. The tallest proposed structures are the transmission line monopoles, which are approximately 75 feet tall.

Operation of the Genesis Project would require onsite nighttime lighting for safety and security at the site. Existing sources of artificial lighting at night in the project vicinity include intermittent vehicles traveling along Interstate 10 as well as fixed light sources at the California State Prisons south of I-10 at the Wiley's Well Road Exit and at the Wiley's Well Rest Stop. Given the lack of night lighting in this remote area, the overall change in ambient lighting conditions at the Project site may be substantial when viewed from nearby offsite locations. Night lighting close to the ground at the Genesis Project site could disturb the resting, foraging, or mating activities of wildlife and make wildlife more visible to predators.

To reduce lighting impacts, the applicant proposed several design features (GESP 2009a, Visual Design Feature 5). Lighting at the facility would be restricted to areas required for safety, security, and operation. Exterior lights would be shielded and oriented to focus illumination on the desired areas and minimize additional nighttime illumination in the site vicinity (GESP 2009a). Switched lighting would be provided for areas where continuous lighting is not required for normal operation, safety, or security. Implementation of these applicant-proposed measures would allow areas surrounding the project to remain un-illuminated (dark) most of the time, thereby minimizing the amount of lighting potentially visible off site and minimizing the potential for lighting impacts to proximate wildlife. These features have been incorporated into Condition of Certification **VIS-3** (Temporary and Permanent Exterior Lighting) and BIO-8. Staff concludes that bird collisions occurring at night would be less than significant and no mitigation is proposed.

Collisions

Bird collisions with structures typically result when the structures are invisible (e.g., bare power lines or guy wires at night), deceptive (e.g., glazing and reflective glare), or confusing (e.g., light refraction or reflection from mist) (Jaroslow 1979). Collision rates generally increase in low light conditions, during inclement weather (e.g., fog, which is rare in the desert), during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing from danger, or diving after prey. Numerous golden

eagle fatalities have been documented near transmission lines where collisions apparently occurred from striking unmarked wires while diving for prey (Kerschner pers. comm.).

Lighting plays a substantial role in collision risk because lights can attract nocturnal migrant songbirds and major bird kill events have been reported at lighted communication towers (Manville 2001) with most kills from towers taller than 300 to 500 feet (Kerlinger 2004). Many of the avian fatalities at communication towers and other tall structures have been associated with steady-burning, red incandescent L-810 lights, which seem to attract birds (Gehring et al. 2009). Longcore et al. (2008) concluded that use of strobe or flashing lights on towers resulted in less bird aggregation, and, by extension, lower bird mortality, than use of steady-burning lights.

As described above, operation of the Genesis Project would require onsite nighttime lighting for safety and security at the site. The transmission line support structures would not be lit and no red incandescent lighting is proposed. With implementation applicant-proposed visual design features and staff-proposed conditions of certification (i.e., **VIS-3** and **BIO-8**) pertaining to minimization of night lighting, lighted Project facilities would not pose a significant collision hazard at night.

However, relative to nighttime collisions with lighted facilities, the risk of bird collisions and other injuries from solar facilities during daytime is unstudied. In particular, bird response to glare from the proposed solar trough technology is not well understood. Although the proposed Project facilities are significantly shorter than 350 feet (the height above which is considered a collision danger for migrating birds), there is concern that the mirrors may appear to a bird as a no-hazard flight area. The mirrors reflect light and take on the color of the image being reflected (Ho et al. 2009). When viewed from an angle near the current direction of the sun, at a distance or an elevated position, the solar field at its most reflective point may appear like a waterbody or lake (GSEP 2009a). Diurnal birds could also be at risk of injury and fatality from burns if they flew into the reflected sunlight between parabolic troughs or landed on the collector tubes of heat transfer fluid.

Staff has concluded that the risk of such impacts is probably low, although very little research has been conducted on the risks of bird collisions at solar facilities. The only such research available is the bird fatality studies at the Solar One facility near Daggett, San Bernardino County (McCrary et al. 1986). Results of that study indicated that much of the bird mortality consisted predominantly of collisions with mirrors, in large part resulting from increased numbers of birds attracted to the adjacent evaporation ponds and agricultural fields. For the Genesis Project, staff has concluded that without such a nearby attractant, bird numbers, and hence likelihood of bird collisions, would be low.

Although staff does not think it likely that mirrors and other structures within the Project Disturbance Area pose a significant collision risk to resident or migratory birds at the Project site, there is insufficient information available to conclude with certainty that the Genesis Project would not be an ongoing source of mortality to birds for the life of the project. Given the lack of research-based data on the impacts of glare and collision threats to birds, staff has proposed Condition of Certification **BIO-16**, which requires implementation of an Avian Protection Plan. The Avian Protection Plan would provide

the information needed to determine if operation of the Project posed a collision risk for birds, and would provide adaptive management measures to mitigate those impacts to less than significant levels.

Lighting – Glare

The proposed solar mirrors and heat collection elements (HCEs or receiver tubes) are sources of bright light caused from the diffuse reflection of the sun. Glint and glare studies of solar trough technology found that pedestrians standing within 20 meters (60 feet) of the perimeter fence when the mirrors rotate from the stowed position to a vertical position may see a light intensity equal or greater to levels considered safe for the human retina (URS 2008). Staff concludes that any wildlife on the ground at a distance of 20 meters or closer could experience similar hazards from unsafe light intensity. Slatted fencing is recommended in the **Visual Resources** section of this analysis to mitigate the problem of bright spots on motorists. Implementation of Condition of Certification **VIS-4** (Reduction of Glint and Glare), which requires that slatted fencing be used as the perimeter fencing primarily to mitigate for impacts to motorists, would prevent glare exposure to wildlife on the ground within 20 meters of the project boundary, thereby reducing the potential for a significant impact. For a complete analysis of glare impacts, refer to the **Visual Resources** section.

Electrocution

Large raptors such as golden eagle, red-tailed hawk, and great horned owl, can be electrocuted by transmission lines if the bird's wings simultaneously contact two conductors of different phases, or a conductor and grounded hardware. This happens most frequently when a bird attempts to perch on or take off from a structure with insufficient clearance between these elements. The majority of bird electrocutions occur on distribution lines between 1- and 60-kV; however, configurations greater than 60 kV typically do not present an electrocution potential because phase-to-phase and phase-to-ground clearances for lines greater than 60-kV are typically sufficient to prevent bird electrocution (APLIC 2006). The proposed transmission lines would be 230 kV; therefore, phase-to-phase and phase-to-ground clearances are expected to be sufficient to avoid bird electrocutions.

Potential impacts to wildlife resulting from electrocution by transmission lines would be minimized by incorporating the construction design recommendations provided in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (APLIC 2006). Specifically, the phase conductors shall be separated by a minimum of 60 inches and bird perch diverters and/or specifically designed avian protection materials should be used to cover electrical equipment where adequate separation is not feasible (APLIC 2006). This is further described in staff's proposed Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures); with implementation of Condition of Certification **BIO-8** staff concludes that the proposed transmission lines would not pose a substantial electrocution threat to birds.

Operation Noise

The majority of operational noise would originate from the power blocks, which would be roughly centered at each site and surrounded by solar fields; this creates a buffer for noise to attenuate before reaching the Genesis Project property boundary and the

Palen/McCoy Wilderness Area. Other minor operational noise sources include mirror rotation and maintenance activities (e.g., mirror washing). Excessive noise could disrupt the nesting, roosting, or foraging activities of sensitive wildlife. The Palen/McCoy Wilderness Area, immediately north of the proposed Project, is an especially noise-sensitive biological receptor.

Because the proposed project is located more than nine miles from a human noise-sensitive receptor, the applicant determined that a full acoustic modeling analysis of project operations was not warranted (GSEP 2009a). However, data provided for nearby proposed solar projects of similar size and technology (i.e., Palen and Blythe Solar Power Projects) serve as a proxy for anticipated operational noise levels of the Genesis Project. As such, operational noise is expected to typically range from 90dBA and for certain equipment to approximately 50 to 60 dBA at greater linear distances from the power generation equipment (GSEP 2009a). Based on these estimates, staff concludes there would be no significant impacts to surrounding wildlife from increased operational noise and no mitigation is proposed. For a complete analysis of operation noise impacts, refer to the **Noise** section.

Evaporation Ponds

The proposed Project includes six, eight-acre evaporation ponds that would collect blowdown water from the cooling towers (GSEP 2009a). A variety of waterfowl and shorebirds seasonally inhabit or utilize evaporation ponds as resting, foraging, and nesting areas. Evaporation ponds in the Sonoran Desert pose several threats to wildlife. First, creation of a new water source to an area where water is scarce would attract ravens to the Genesis Project, potentially increasing predation rates on juvenile desert tortoise in adjacent habitat. Second, waterfowl, shorebirds, and other resident or migratory birds that drink or forage at the ponds could be harmed by selenium or hyper-saline conditions resulting from high total-dissolved-solids concentrations (EPTC 1999; Lemly 1996; Windingstad et al. 1987). Staff, CDFG, and USFWS are concerned about these threats to wildlife posed by the evaporation ponds.

Dry cooling is being evaluated by staff as an alternative to wet cooling (refer to the **Alternatives** section of this Staff Assessment) and zero liquid discharge (ZLD) remains a viable wastewater disposal alternative to evaporation ponds. These alternatives would eliminate impacts from wildlife exposure to the evaporation ponds and is recommended by staff, CDFG, and USFWS. If either of these alternatives is not adopted and evaporation ponds would be constructed for the Genesis Project, staff proposes Condition of Certification **BIO-21**, which requires installation of netting over the evaporation ponds to exclude birds and other wildlife as well as a monitoring program to ensure the effectiveness of exclusion. Implementation of this measure would reduce evaporation pond impacts to birds to less-than-significant levels.

Special-status Plant Species

Regional Overview

The Sonoran Desert region of southeastern California, a region bounded by the Mojave Desert to the north and by the higher elevations of the Peninsular Ranges to the west, has a uniquely ‘tropical’ warm desert climate influenced by the addition of monsoonal

summer rains; a contrast to the dry summer Mediterranean climate that characterizes much of California. This under-surveyed southeastern corner of California has a bi-modal rainfall pattern, with cooler late fall and winter rains that originate in the North Pacific Ocean, and tropical summer storms from southern Mexico (Conservation Biology Institute 2009).

The unique position of the region at the junction with the Neotropic ecozone to the south contributes to the presence of a number of rare and endemic plants and vegetation communities specially adapted to this bi-modal rainfall pattern, and not found elsewhere in California. These include microphyll woodlands, palm oases, and a number of summer annuals that only germinate after a significant warm summer rain.

This distinctive bi-modal climate of the Sonoran Desert distinguishes it, floristically, from other deserts, including the Mojave Desert, and from the rest of California, which is characterized by warm dry summers and a single rainy season in winter. In addition to being hotter and drier, the Sonoran Desert region also rarely experiences frost. Although the region supports numerous perennial species, including a wide variety of cacti, more than half of the region's plant species are herbaceous annuals, which reveal themselves only during years of suitable precipitation and temperature conditions.

This region also occupies an important biogeographic location and zone of ecological transition on the Pacific coast of North America, and so its floristic diversity includes many widespread taxa on the edge of their range. This includes all of the CNPS List 2 plants occurring in the region—species that are more common outside of California but here they represent geographically marginal, peripheral populations on the frontiers of their range. The evolutionary significance—and therefore the conservation value—of peripheral populations are well documented, as is their greater risk of extirpation (Leppig & White 2006).

Summary of Project Impacts and Mitigation

Spring 2009 and 2010 surveys of the Project transmission gen-tie line and the proposed SCE Colorado River Substation (AECOM 2010d) indicate that construction of the Project would directly impact four special-status plant species:

- Harwood's eriastrum (also sometimes referred to as Harwood's phlox), (*Eriastrum harwoodii*), a BLM Sensitive species, CNPS List 1B (rare, threatened, or endangered throughout its range);
- Harwood's milk-vetch (*Astragalus insularis* var*. harwoodii*), a CNPS List 2 (rare, threatened, or endangered in California but more common elsewhere);
- Desert unicorn plant (*Proboscidea althaeifolia*), a CNPS List 4 (limited distribution; a 'watch list'), and
- Ribbed cryptantha (*Cryptantha costata*), also a CNPS List 4.

The spring surveys also detected a single plant of Las Animas colubrina, a CNPS List 2; however, it occurs approximately one mile north (upstream) of the Project site and no significant direct or indirect effects are expected. Staff concludes that the Project's direct, indirect, and cumulative impacts to two special-status species—Harwood's eriastrum (a BLM Sensitive species) and Harwood's milk-vetch—are significant. Staff

concludes that although the impacts of all present and reasonable foreseeable future projects in the NECO planning area (see **Biological Resources Table 9**), and projects throughout their range in California, to both plants and the desert washes that support them, are cumulatively considerable. Staff concluded that impacts to ribbed cryptantha are less-than-significant because many occurrences representing tens of thousands of ribbed cryptantha have been documented during the spring surveys of three projects in the vicinity. Staff concludes that although the direct effects of the Project on desert unicorn plant are minor, the impacts of all present and reasonable foreseeable future projects in the NECO planning area (see **Biological Resources Table 9**) on plants or on the sandy washes that support the species are cumulatively considerable.

Based on consultation with recognized experts in the flora of the California Desert region (J. Andre, T. LaDoux, D. Silverman, A. Sanders, pers. comm.) staff has also concluded that potentially significant impacts to special-status plants could be missed unless additional late season surveys are conducted. Late-season plants regarded as having a moderate to high potential for occurrence in the Project area (including the proposed Colorado River Substation site) include the three species listed below; however, the under-surveyed and poorly-understood nature of the region suggests that unanticipated finds are also likely (Andre pers. comm.), including Arizona species not currently known to occur in California (Silverman pers. comm.):

- Abram's spurge (*Chamaesyce abramsiana*) – CNPS List 2.1, NatureServe rank G4/S1.2;
- Flat-seeded spurge (*Chamaesyce platysperma*) – BLM Sensitive, CNPS 1B.2, NatureServe rank G5/S1.2; and
- Lobed ground cherry (*Physalis lobata*) – CNPS List 2.3, NatureServe rank G5/S1.3.

Several additional late-season species were identified with potential to occur; however, their blooming seasons overlap the spring survey window and it is expected that they could have been detected during a spring survey, if present. Nevertheless, summer-fall survey crews should be trained to recognize the following additional species: glandular ditaxis; California ditaxis; jack-ass clover, and Palmer's jack-ass clover (a proposed addition to the CNPS Inventory and known to occur at Palen Dry Lake in marginal dune habitats). Descriptions of these additional species are provided in the subsection C.2.4.1 of this section. Desert unicorn plant is typically easier to detect during late season surveys and impacts to this species are discussed below under the discussion of the spring survey results.

Staff's proposed Condition of Certification **BIO-19** (Special-Status Plant Mitigation) includes a requirement to conduct late-season surveys in summer-fall 2010 to ensure that any plants missed during the spring surveys would be detected and any impacts mitigated. Triggers and performance standards for mitigation of impacts are also included in **BIO-19** to ensure that impacts to any special-status plants found during the late season surveys are mitigated to a level less than significant. Implementation of the avoidance and minimization measures contained in Section A of **BIO-19** and **BIO-20** (Compensatory Mitigation for State Waters) would reduce the Project's contribution to cumulative effects to desert unicorn plant to a level less than significant. The avoidance and minimization measures, combined with the compensatory mitigation standards

described in Section D of **BIO-19**—acquisition and enhancement (restoration)—would reduce the impacts to Harwood's milk-vetch to a level less than significant and would ensure a no-net-unmitigated loss for the BLM Sensitive Harwood's eriastrum. The avoidance and minimization measures would be applied to all avoided special-status plants, including ribbed cryptantha.

Assessment Methodology and Analytical Tools

Staff's determinations of significance were based on the following considerations:

- Proportion of occurrences affected by the Project relative to the total number of documented occurrences in California;
- NatureServe 2009 rank (which encompasses rarity, threats, and population trend);
- Impacts to the local (Chuckwalla Valley or Palo Verde Mesa) population from all proposed projects;
- Impacts to hydrologic or geomorphic processes necessary to sustain the habitat (e.g., diversion or alteration of desert washes, altered sediment transport, interrupted wind transport of dune-maintaining sands;
- Ecological integrity of affected and remaining habitat;
- Cumulative effects and threats to remaining occurrences;
- Ownership and management threats to remaining occurrences;
- Status as a peripheral or disjunct population (or position within the species range);
- Indications of any other population characteristics that may assign it local or regional significance;
- Other potential indirect effects of fragmentation (and its effects on gene flow), invasive plants, increased risk of fire, OHV use of new access roads, operation impacts (dust, chemical drift), and climate change; and
- Intrinsic vulnerability of the species.

In addition to state and federal-listed plant species, and BLM sensitive species, staff's definition of special-status plants also included CNPS List 1B, 2, 3 and 4 plants, and a few currently unlisted plants that are proposed additions to the CNPS Inventory. Additionally, a potentially new un-described taxon of saltbush (*Atriplex*) was discovered on the marginal dunes of Palen and Ford Dry Lakes in spring 2010, underscoring the region's under-surveyed and poorly understood flora. CNPS List 3 plants (plants of questionable taxonomic status) may be analyzed under CEQA if sufficient information is available to assess potential impacts to such plants. CNPS List 3 and 4 may be considered regionally significant if, for example, the occurrence is located at the periphery of the species' range, exhibits unusual morphology, or occurs in an unusual habitat/substrate.

Staff consulted with several recognized experts in the region's rare plant flora during the preparation of the data requests and its analysis of impacts to special-status plants (J. Andre, T. LaDoux, D. Silverman, A. Sanders, pers. comm.). Other sources consulted include the CNDDB (CNDDB 2010), the CNPS online inventory (CNPS 2009) and the

BLM Palm Springs occurrence records (unpublished). The Consortium of California Herbaria (CCH 2010) was reviewed to determine if there were additional documented occurrences that were not already included in CNDDB. To improve its analysis, staff loaded the occurrence data into an ESRI GIS-based web application that allowed staff to view all CNDDB and CCH occurrences overlain on various jurisdictional, biological, landform, utility, USGS topographic maps and aerial imagery. This allowed staff to better understand a species' threats and management vulnerabilities relative to probable future renewable energy projects throughout their range, their distance and proximity to projects or features, their peripheral status, potential for fragmentation and other indirect effects from nearby development, ownership and management threats to remaining occurrences and to see the variety of habitats and landforms associated with a given species' occurrences. The following is a list of datasets that were utilized in staff's analysis:

- PLATTS Transmission Data: licensed 3-rd party commercial transmission data);
- CA State County boundaries: http://atlas.ca.gov/download.html?sl=casil
- CNDDB RareFind: http://www.dfg.ca.gov/biogeodata/cnddb/cnddb_info.asp
- BLM Renewables Projects: BLM online solar and wind project data: http://www.blm.gov/ca/gis/
- CA STATSGO Soils: NRCS soil mapping from http://SoilDataMart.nrcs.usda.gov/
- CA Cities boundaries: Part of PLATTS Transmission Data delivery
- CA State Parks boundaries: http://atlas.ca.gov/download.html?sl=casil
- Federal Wilderness boundaries: http://www.blm.gov/ca/gis/
- Federal Lands ownership boundaries: http://www.blm.gov/ca/gis/
- CA GAP Vegetation: http://www.biogeog.ucsb.edu/projects/gap/gap_data_state.html
- Landforms NECO: from BLM Palm Springs Office – no Metadata – based on CA GAP but improved by BLM for NECO area
- Landforms MDEP: Mojave Desert Ecosystem project: http://www.mojavedata.gov/datasets.php?&qclass=geo
- Aerial Imagery – ESRI Data from ArcGIS.com
- USGS Topo – ESRI Data from ArcGIS.com

Impacts to Special-Status Plants Found During Spring 2009 and 2010 Surveys

This section addresses the direct and indirect effects of the Project to plants found within the Project Disturbance Area and one-mile buffer during the spring 2009 or 2010 surveys. The spring 2009 surveys encompassed the entire Project Disturbance Area and the survey results are presented in the Biological Resources section of the AFC (GSEP 2009a). The tabular results and raw GPS data from the spring 2010 surveys of previously un-surveyed areas were submitted in May 2010 (TTEC 2010m) and are reflected in this analysis. The new areas surveyed during 2010 include the transmission line and surrounding buffer area, southward to the gen-tie location with the Blythe

Energy Transmission Line Project and the SCE Colorado River Substation which was surveyed during 2010 for the Blythe Solar Power Project (AECOM 2010d). In addition to state and federal-listed plant species, and BLM Sensitive species, staff's definition of special-status plants also includes CNPS List 1B, 2, 3 and 4 plants, as well as unlisted plants with local or regional significance as defined in the 2009 CDFG protocols for botanical assessments (CDFG 2009).

Harwood's Eriastrum

Harwood's eriastrum, also sometimes referred to as Harwood's phlox or Harwood's woollystar, is a BLM Sensitive species, and CNPS List 1B.2 species, which indicates it is rare, threatened, or endangered throughout its range. It has a NatureServe (CNDDB) rank of 2, meaning it is an imperiled species. This spring annual is associated with sandy plains or dunes, but typically semi-stabilized habitat (versus active dunes) (CNPS 2010). Its global distribution and range is restricted to 14 known locations in San Diego, Riverside, and San Bernardino counties, typically in dunes associated with the margins around dry lakes such as Dale, Cadiz, and Soda lakes. Recently, surveys conducted in spring of 2010 for the Blythe Solar Project located this plant primarily in the sandy areas south of I-10, where 2,134 plants were located and mapped (AECOM 2010d,TTEC 2010o). The majority of these plants occur at the proposed Colorado River Substation site; however, plants could also be directly and indirectly affected by construction of the Project's gen-tie line in the vicinity of the substation.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 2 new occurrences that were not in the CNDDB (CCH 2010). Both of these are historical records from 1939 and 1958. Of the total of 14 occurrences in California (12 CNDDB plus two additional historic records), 3 of these are protected under National Park Service or State Park ownership. A total of three records are historical records. Four of these occurrences have documented threats, including OHV and non-native plant impacts.

Staff does not have site-specific or construction details for the construction of the Project gen-tie line in the vicinity of the proposed Southern California Edison Colorado River Substation, where Harwood's eriastrum were detected during 2010 surveys for the Blythe Project (TTEC 2010o). Thus staff cannot quantify the impacts of the Gen-tie line or the substation extension on Harwood's eriastrum except to conclude that temporary direct impacts from construction of these facilities are likely, that permanent direct impacts are possible, and that indirect effects are likely. Indirect Project effects to Harwood's eriastrum in the vicinity of the Project gen-tie line include the spread of the non-native Sahara mustard across its dune habitat, which also degrades the habitat by prematurely stabilizing dunes. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas could also impact Harwood's eriastrum.

BLM requests 100 percent on-site avoidance for BLM Sensitive plants like Harwood's eriastrum, although the level of avoidance would be decided on a case-by-case basis (Lund pers. comm.). Staff's proposed Condition of Certification **BIO-19** requires the Project owner to incorporate site design modifications to minimize impacts and meet the avoidance standard along the Project linears. Such avoidance could include: using

existing roads to limit new road construction; limiting the width of the work area, adjusting the alignment of the Project gen-tie line, and driving and crushing vegetation as an alternative to blading spur roads to access pole locations. With implementation of the avoidance and minimization measures described in Condition of Certification **BIO-19**, impacts to Harwood's eriastrum would be reduced to less than significant levels.

Harwood's Milk-Vetch.

Harwood's milk-vetch is a CNPS 2.2 species, a rank that indicates it is fairly threatened in California but more common elsewhere. It is also a covered species under NECO. It is found in desert dunes and sandy or gravelly areas in portions of Imperial, Riverside, and San Diego counties (CNPS 2009). Herbarium collections occur for this species from Ogilby Road in Imperial County and three locales west of Blythe, the Pinto Basin, and Chuckwalla Basin in Riverside County. Harwood's milk-vetch has also been reported from Baja California, Sonora Mexico, and portions of Yuma County, Arizona (Reiser 1994). There are several CNDDB records for this species within the Project area (CNDDB 2010) and a 10-mile radius of the Project area. There is a record in the Consortium of California Herbaria database from Wiley's Well Road between McCoy and Mule Mountains from 400 feet elevation (CCH 2010). The Harwood's milk-vetch populations on the southern deserts are presumed stable given limited disturbance to their desert habitats (Reiser 1994), but the recent push for renewable energy development threatens a large portion of its habitat in Chuckwalla Valley and the broader NECO planning area. What remains of the Chuckwalla population will be fragmented by the many future projects proposed and subject to the indirect effects of invasive pest plants, which quickly colonize.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 3 new occurrences that were not in the CNDDB. All of these are historical occurrences. Of the total 46 occurrences in California (CNDDB plus new additional occurrences), 9 of these are protected under National Park Service or State Park ownership. A total of 11 records are historical records. Sixteen of these occurrences have documented threats including development, OHV, agriculture, transmission lines, road maintenance, and trash dumping.

Spring 2010 surveys identified several hundred (700+) plants of Harwood's milk-vetch along the transmission line and buffer area (TTEC 2010m). In addition, several Harwood's milk-vetch occurrences of unknown size were identified in the vicinity of the proposed SCE Colorado River Substation, south of I-10 at the southeast end of Chuckwalla Valley. Spring 2009 surveys identified twelve plants of Harwood's milk-vetch within the study area, only two of which occurred within the plant site Disturbance Area, and 10 plants within linear Disturbance Area. Significant indirect effects anticipated include alteration of the hydrology and sediment transport of the desert washes, as well as spread of Sahara mustard across its habitat, which also degrades its habitat by prematurely stabilizing dunes. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas are also likely. Global warming is also anticipated to adversely affect this and other desert annuals by delaying the fall rains beyond the optimum germination temperatures for many desert annuals in the Sonoran Desert region. Although many new occurrences have been found around the Chuckwalla Valley and Palo Verde mesa,

many are also impacted by renewable energy projects, which fragment the remaining habitat, disrupt gene flow, and render the remaining occurrences more vulnerable to future impacts.

Staff concludes that the direct, indirect, and cumulative impacts of the Project to Harwood's milk-vetch are significant. Staff recommends the following mitigation to minimize the direct, indirect, and cumulative impacts to Harwood's milk-vetch to a level less than significant:

1. Implement avoidance and minimization measures for avoided plants as described in **BIO-19**;

2. Incorporate site design modifications to minimize impacts where feasible to minimize impacts along the linears, such as limiting the width of the work area and minor adjustments to the alignment of the linears or placement of poles (within the constraints of the ROW or utility easement), and

3. Off-site mitigation through compensation (acquisition) or restoration and enhancement as described in **BIO-19**.

<u>Desert Unicorn Plant</u>

Desert unicorn plant is documented from at least 37 occurrences in Riverside, Imperial, San Bernardino, and San Diego Counties, several of which are from the Chuckwalla Mountains and Desert Center area; however, occurrences are relatively small and many of the local occurrences may be directly or indirectly affected by proposed solar Projects between Blythe and Desert Center. Staff concludes that although the direct effects of the Project on desert unicorn plant are minor, the impacts of all present and future projects (see **Biological Resources Table 9**) on sensitive plants or on the sandy washes and important sediment transport that support the species on desert washes along the eastern base of the McCoy Mountains and the Palo Verde Mesa are cumulatively considerable. Indirect impacts to off-site (downstream) occurrences are also expected to indirectly affect the species habitat by altering the hydrology and sediment transport processes. Staff recommends implementation of avoidance and minimization measures for avoided plants as described in **BIO-19** to reduce the Project's contribution to cumulative effects to less than significant levels.

<u>Ribbed Cryptantha</u>

Ribbed cryptantha is a CNPS 4.3 species, meaning that it has limited distribution in California; however it is not very threatened in California. There are 116 records of this species from several locations throughout Riverside, Imperial, San Diego, and Imperial counties in the Consortium of California Herbaria database; the nearest collection is from the Palen Valley approximately three miles east of the Desert Center Airport (CCH 2010).

Spring 2009 surveys identified a single population of a few ribbed cryptantha northwest of the Wiley's Well rest area at approximately 380 feet elevation from an area of mixed sand drifts, hummocks with Patton tank tracks with widely scattered shrubs (GSEP 2009f). Preliminary survey findings from spring 2010 estimated that several tens of thousands of individual plants and large populations of ribbed cryptantha along the

transmission line and buffer area (TTEC 2010m). In addition, several ribbed cryptantha plants and a large occupied habitat area of this species were identified within the six-pole extension area needed for the gen-tie transmission line associated with the SCE Colorado River Substation site (TTEC 2010o).

Many similarly large occurrences of ribbed cryptantha have been found during the spring surveys for at least three projects, totaling over 100,000 plants and possibly many more. Staff has concluded that because of the local abundance of this species in the Project vicinity and its apparently stable population in its range in California, that the impacts of the Genesis Project are less-than-significant. However, staff recommends that the avoidance and minimization measures contained in **BIO-19** be applied to all avoided special-status plants to ensure that the Project does not result in unanticipated indirect impacts.

Impacts to Special-Status Plants That May Be Detected During the Summer-Fall 2010 Surveys

Within the larger group of plants that can only be identified during late season surveys, there are two subgroups: 1) annuals that are triggered by warm summer rains of subtropical origin (typically minimum 10mm events), and 2) perennials that bloom regardless of the summer rain, and are triggered instead by the appearance of cooler storms that originate in the Pacific northwest. This discussion includes an analysis of impacts to 'potentially occurring' late-season special-status plants and the triggers for mitigation and specific mitigation measures. These triggers were designed to ensure that any anticipated or unanticipated species detected during the summer-fall 2010 surveys will be mitigated to levels less than significant. This mitigation would be achieved through a variety of avoidance and minimization measures, restoration (enhancement projects), and compensatory mitigation through the acquisition and protection of other occurrences and their habitat.

It has been estimated that 30 to 40 percent of the species in the California Desert flora reach their reproductive maturity in late summer or fall (J. Andre pers. comm.). However, there is a long-standing precedent of spring season surveys for special-status plants in California, based on the dry summers and summer-dormant flora of the Mediterranean climate that dominates California. There are exceptions, of course, for late-season blooming species, but the plant survey effort in California typically consists of a major spring survey with narrowly focused summer surveys for any late season species that may occur in the region. Regional botanical experts (J. Andre, T. LaDoux, D. Silverman, A. Sanders, pers. comm.) have concluded that significant finds could be missed in the absence of an additional late season botanical survey.

Because the region's flora is so under-surveyed and poorly understood relative to other parts of the desert or state, and because its flora is so intertwined with its variable and unpredictable climate, it is difficult to predict accurately what special-status plants have potential to occur in this region. This is evidenced by the discovery of a potentially new taxon of saltbush on Palen Dry Lake (Andre pers. comm.), a new undescribed species of lupine on a renewable energy project near Barstow, a recent discovery of a new perennial spurge in the Orocopia Mountains by Victor Steinmann (LaDoux pers. comm.), and several unanticipated range extensions of special-status plants have been

found, such Utah vining milkweed, and a slight range extension for Harwood's eriastrum. Additionally, some rare plants have been found in habitats not previously known to occur in. For example, lobed ground cherry was recently discovered growing outside of its characteristic playa margin habitat in uplands (Andre pers. comm.).

Several late-season special-status plants were identified with moderate to high potential for occurrence based on the presence of suitable habitat and known occurrences in the region; their rarity, status, and known distribution are discussed below (Abram's spurge, flat-seeded spurge, and lobed ground cherry). However, staff understands that range extensions and new species are also possible in this under-surveyed region and has addressed this potential with specific triggers for mitigation, based on rarity and status, with provisions for a variety of possible scenarios. The triggers are described under "Discussion of Mitigation", following this discussion of late-season species known from the region.

Several additional perennial species were identified with potential to occur; however, their bloom seasons overlap the spring survey window and it is expected that they could have been detected during a spring survey, if present. Nevertheless, summer-fall survey crews should be trained to recognize the following additional species: glandular ditaxis; California ditaxis; jack-ass clover, and Palmer's jack-ass clover (a proposed addition to the CNPS Inventory and known to occur at Palen Dry Lake in marginal dune habitats).

Abram's Spurge

Abram's spurge (CNPS List 2) has a NatureServe rank of G4/S1.2; i.e., it is 'critically imperiled' within its range in California. It is a summer annual that is triggered to germinate by significant summer monsoonal rains; consequently, its year-to-year population size is highly variable. It was not detected during the 2009 or 2010 spring surveys; however, the washes and other low-lying areas could support this species. This species is known to occur in halophytic flats, playas, and along inlets and floodplains of playas. It tends to prefer the lower floodplain ecotone but can also extend higher up along the washes that feed the playa (Silverman, pers. comm.). The blooming period is described in the CNPS Inventory (CNPS 2009) as September through November but it could be detected earlier if significant (>0.10mm) summer rain event occurred in June. On average, August receives the most rainfall, but the warm monsoonal rains sometimes overlap the start of the fall-winter rains of Pacific Northwest origin.

Staff concludes that if present, impacts to Abram's spurge would be considered significant unless only a minor portion of its local population was affected. Even if found off-site in the playa margins, it could be indirectly affected by the diversion of the channels that support it, and the alteration of the site hydrology and sediment transport in the channels, which provide fresh, loose seed beds for many of the areas rare species. Global warming is expected to adversely affect annual species like Abrams spurge in the Sonoran Desert as rains are predicted to occur later in the fall when temperatures are cooler and not adequate for germination.

The CNDDB (CNDDB 2010) lists 15 occurrences of this plant in Riverside, Imperial, San Bernardino, and San Diego counties in California, east through Nevada to Arizona, and as far south as Baja California, Mexico. Of the total of 15 occurrences in California, 7 of these are protected under Park Service, CDFG, or State Park ownership. A total of 4 records are historical (pre-1972) that have not been confirmed since collected. One of these occurrences is described as threatened by grazing. A recent 2000 CNDDB record is from a location approximately 0.50 mile east of Ford Dry Lake on Gasline Road just south of I-10 and the occurrence was reported as a "substantial population" (CNDDB 2010).

If present, implementation of the off-site mitigation measures described in **BIO-19**, and the avoidance and minimization measures would be required to mitigate effects to Abram's spurge to a level less-than-significant. Under certain conditions (see **BIO-19**), the level of protection would be increased and some onsite avoidance may be required.

Atriplex sp. nov

A potentially new taxon of saltbush (*Atriplex*) was discovered on the saline playa margins of Palen Dry Lake last year by a botanist with the U.C. Reserve System (Andre and La Doux, pers comm). The BLM State Botanist and Plant Conservation Program Lead (Lund pers comm) indicated that BLM would treat all new taxa as BLM Sensitive species. The new taxon was not detected during the Project spring 2010 surveys but it is not clear whether it was included by field crews as a potentially occurring special-status plants. It could be detected during the summer-fall 2010 surveys, if present. No suitable habitat is present for this taxon in the solar fields but it could be indirectly affected by alterations of the surface drainage patterns between the solar fields if it occurs in the playa margins of Ford Dry Lake. If present, **BIO-19** (Section A) directs the Project owner to avoid direct impacts according to direction by the BLM State Botanist and modify the engineered channel discharge to ensure that any special-status plants occurring downstream are not affected by alterations of the surface drainage patterns. . If indirect effects cannot be avoided, compensatory mitigation shall be required as described in Section D of **BIO-19**. Staff directs the Applicant to ensure that all field crews employed for the summer-fall 2010 surveys are trained to detect the new taxon, and to conduct the surveys consistent with guidelines in Section B of **BIO-19**. Section C of **BIO-19** would ensure that impacts to any new taxa are mitigated to a level less than significant.

Flat-seeded Spurge

Flat-seeded spurge is a CNPS List 1 B.2 species, meaning it is rare, threatened, or endangered throughout its range and it is fairly threatened in California. It is also a BLM Sensitive species and has a NatureServe rank of G3/S1.2. Some experts have speculated that it may be a "waif" in California, or a species that is not naturalizing, and note that it is more common in Arizona and Mexico (CDFG 2010). If present, impacts to flat-seeded spurge would be considered significant unless only a minor portion of its local population was affected.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 1 new occurrence that was not in the CNDDB. This occurrence is a historical record from 1933. Of the total five occurrences in California (CNDDB plus new

additional occurrences), only 1 of these are protected under State Park ownership. A total of three records are historical records. None of these occurrences have documented threats and the threat rank indicates that its distribution in California is relatively stable at this time. Likely indirect effects include the spread of Sahara mustard and Russian thistle across its habitat, and the premature stabilization of the dunes that support it. Channel diversion and the interruption of aeolian and fluvial sediment transport are also likely, if detected in the Project area. Global warming is expected to disproportionately (and adversely) affect low elevation annual species like flat-seeded spurge in the Sonoran Desert.

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BLM requests 100 percent on-site avoidance for BLM Sensitive plants but the BLM State Botanist will decide the level of avoidance on a case-by-case basis, if present. Implementation of the Avoidance and Minimization measures in **BIO-19** would be required to protect avoided plants.

Lobed Ground Cherry

Lobed ground cherry is a CNPS List 2.3 species, meaning that is rare, threatened, or endangered in California, but more common elsewhere; the threat rank indicates that it is not very endangered in California. It has a NatureServe rank of G5/ S1.3, indicated that it is very rare in California but relatively stable outside of California. It occurs largely on alkaline dry lake beds but it has also been found in drier, less saline-alkaline environments on decomposed granitic soils in Mojave desert scrub habitat.

Staff reviewed the occurrence data in the Consortium of California Herbaria and detected 2 new occurrences that were not in the CNDDB. Both of these are more recent occurrences, including one from Joshua Tree National Monument and one in the eastern Mojave Desert. Of the total 6 occurrences in California (CNDDB plus new additional occurrences), none of these are protected under Park Service or other agency land ownership. None of these are historical records and none have documented threats.

Staff would consider that impacts to this very rare species in California would be significant, unless only a minor portion of its local population was affected. Such an occurrence would also represent a significant range extension. Likely indirect effects, if present, would include the spread of Russian thistle across its habitat and potential OHV impacts from the creation of new access roads into its habitat. Even if found off-site in the playa margins, it could be indirectly affected by the diversion of the channels that support it, and the alteration of the site hydrology and sediment transport systems that support the dunes. Additionally, global warming is expected to adversely affect this annual species as rains are predicted to occur later in the fall (and thus in cooler temperatures not adequate to germinate many of the desert annuals). Implementation of the off-site mitigation measures described in **BIO-19**, and the avoidance and minimization measures would be required to mitigate the effects to a level less-than-significant. Under certain conditions (see **BIO-19**), the level of protection would be increased and some onsite avoidance may be required

Indirect Impacts to Special-Status Plants

The anticipated indirect impacts to special-status plants, i.e., impacts outside the Project Disturbance Area or that occur following construction include: introduction and spread of invasive plants; alteration of the surface hydrology and basic geomorphic processes that support rare plants and their habitat (e.g., disrupted aeolian and fluvial sand transport processes from obstructions and diversions); population fragmentation and disruption of gene flow; potential impacts to pollinators; increased risk of fire; erosion and sedimentation of disturbed soils which render the habitat vulnerable to invasion by pest plants; disturbance of the structure and ecological functioning of biological soil crusts which affect seed germination, reduce soil nutrition, carbon sequestration, and render the soil vulnerable to water and wind erosion (Belnap & Eldridge 2001); herbicide and other chemical drift; and disruption of photosynthesis and other metabolic processes from fugitive dust during construction and operation of the Project.

Following construction, exotic species are characteristically opportunistic and could occupy disturbed soils within the Project Disturbance Area and spread into adjacent vegetation communities. Invasive weeds with severe ecological impacts such as Sahara mustard can quickly colonize disturbed soils following construction. The primary conduit for spread, however, is along roads and transmission corridors. The dramatic increase in vehicle use of the Project vicinity roads and construction of transmission corridors and new roads is expected to increase the spread of this highly invasive wildland pest. Sahara mustard has shown a clear negative impact on native flora (Barrows et al. 2009). Sahara mustard can form dense stands and potentially crowd out native annual plants. Sahara mustard plants growing early in the season may dominate available soil moisture which may adversely affect native annuals which start growing a little later in the season (Barrows et al. 2009). Barrows et al. (2009) found that native annuals growing under a canopy of Sahara mustard were often taller and were etiolated, at the expense producing branches, flowers, and fruits. This led to a shift in the dominance of the following year's species composition from native annuals to Sahara mustard.

Tamarisk, Russian thistle, Sahara mustard and Mediterranean grass are already present in the Project area and are expected to increase as a result of construction- and operation-related disturbance. The proliferation of many non-native plants has dramatically increased the fuel load and frequency of fire in many desert ecosystems (Lovich & Bainbridge 1999). Unlike other ecosystems in California, fire was not an important part of the Mojave Desert ecosystems and most perennials are poorly adapted to even low-intensity fires, and the animals that coevolved are not likely to respond favorably to fire either. The potential spread or proliferation of non-native annual grasses, combined with the proximity to ignition sources could potentially increase the risk of fire, and the effects to these poor-adapted desert communities would be harmful, particularly to cacti and most native shrubs species. Burned creosote and other native shrubs are typically replaced by short-lived perennials and non-native grasses (Brown & Minnich 1986). The spread of invasive plants is a major threat to biological resources in the Colorado Desert because non-native plants can displace native plants, increase the threat of wildfire, and supplant wildlife foods that are important to herbivorous species.

Wildfires (caused by construction or downed transmission lines) are rare but the increase in daily vehicle use in the area from an anticipated 200 new jobs during operation and up to 1,000 jobs during construction will significantly increase the risk of ignition. Other temporary and permanent impacts from the Project could occur to surrounding vegetation communities from grading activities creating air-born, fugitive dust, sedimentation, and erosion, which disruption of photosynthesis and other metabolic processes. The destruction of plants and soil crusts by windblown sand and dust also exacerbates the erosion of the soil and accelerates the loss of nutrients (Okin et al. 2001).

Discussion of Mitigation

Triggers for Mitigation for Impacts to Late-Season Plants. In recognition of the unpredictability of the region's rare plant flora, staff has incorporated into **BIO-19** specific triggers for mitigation that are designed to address any unanticipated special-status plants detected during the late season surveys and thus ensure that any unforeseen finds are adequately mitigated. The triggers are based on the internationally accepted Natural Heritage Methodology, available online at: http://www.natureserve.org/prodServices/heritagemethodology.jsp. Included in this methodology is the NatureServe global and state ranking process (www.natureserve.org/explorer/ranking) which provides an estimate of extinction risk worldwide and in California. An explanation of the rankings is provided in the explanation of status codes as a footnote to **Biological Resources Table 3**. The triggers assign a threshold for mitigation based on the NatureServe Global and State Rank, and the portion of the total documented occurrences that are affected by the project.

The triggers for mitigation are also based—in concept—on The Nature Conservancy (TNC) Sonoran Desert Region conservation goals (Randall pers. comm.), a set of peer-reviewed goals which are also based on the NatureServe ranking protocol. Staff increased the rank-based conservation goals to reflect their use as a trigger for mitigation for any special-status plants detected in the 2010 summer-fall surveys, and to incorporate consideration of various threats or scenarios not already inherent in the NatureServe rank.

The State rank, and the assessment of threats (inherent in the threat rank), is conducted by the CNDDB botanist using NatureServe protocol, and includes a more detailed threat ranking. A detailed explanation of the ranking process is available at: <www.natureserve.org/publications/ConsStatusAssess_StatusFactors.pdf.> Factors considered in the designation of global and state ranks include: range extent; area of occupancy; population size; number of occurrences; the percent of occurrences with good viability/ecological integrity; environmental specificity; long-term and short-term population trend. Energy Commission staff are coordinating with CNDDB to run an updated NatureServe rank to conform with the new 2009 NatureServe conservation status ranking protocol, which combine rarity, threats, and trend into a single ranking and consider many new subcategories. The new system eliminates the decimal threat add-on rank (e.g., S2.2) and incorporates the threats into the overall rank. Thus, if much of the BLM land within a species range is threatened by energy development, OHV, grazing, and other incompatible land uses that must be protected under its multi-use

zoning (outside of DWMAs), then these threats would be captured in the new rank. The threats to species with many occurrences on private land (versus protection on National Park Service lands) would be similarly reflected in the new rankings. A species that is not as rare in numbers, but has many occurrences that are threatened, or an overall downward trend, then it could potentially move an S2-ranked species to an S1, for example. Conversely, if many new occurrences have been found as a consequence of the many new surveys being conducted in the region (e.g., for renewable energy projects), then the rank could conceivable be downgraded.

The accounting or inventory of the species' total known or documented occurrences shall be based on the following sources: CNDDB processed and unprocessed data; California Consortium of Herbaria and other herbaria records; BLM records; survey data from other renewable energy projects and other related projects for which survey data is available; and reported occurrences by qualified botanists accompanied by a completed CNDDB or similar field form (with or without voucher specimens). Data considered unreliable include records for which the range is implied in literature but without collection numbers or specific location information, and anecdotal reports without documentation or from non-credible sources. Occurrences based on historic (pre-CEQA, or pre-1972) collections that have not since been verified will not be considered as a documented occurrence.

The triggers for mitigation also include a provision for requiring on-site avoidance of any particularly significant finds that cannot be adequately mitigated off-site. The triggers also include provisions for upgrading the mitigation requirements for an occurrence with 'local or regional significance'. Local and regional significance is defined by CNPS 2001 guidelines and in the CDFG 2009 guidelines for assessing impacts to special-status plants, and include a threat rank of 1 or 2 (threatened and very threatened), and significant cumulative effects. New undescribed species and proposed additions to the CNPS Inventory would be treated as a CNPS List 4 (state rank 3) unless recommended otherwise by the CNDDB or CNPS Rare Plant Botanist after the initial phase of the peer-review process. There is also a provision to encompass the special needs of state- or federal-listed species.

Compensatory Mitigation for Significant Impacts to Spring and Late-Season Plants. BLM requests 100 percent on-site avoidance for BLM Sensitive plants but the level of avoidance is decided on a case-by-case basis (Lund, pers comm). On-site avoidance is also for non-BLM Sensitive species with a NatureServe Global Rank of G1 or G2 if the impact exceeds 10 percent of the species' known and documented occurrences. For non-BLM Sensitive species, the Project owner would be required to avoid a minimum of 75 percent of the total population. For perennial taxa the percent avoidance would be measured based on the percentage of the total individuals affected; for annuals the percent avoidance would be measured based on the total area occupied by the occurrence plus any additional habitat deemed critical for maintenance of the population (e.g., the upstream reach of a wash for wash-dependent species). For these very rare and critically imperiled species, the Project owner would be required to incorporate site design modifications to minimize impacts and meet the avoidance standard, including using existing roads to limit new road construction; limiting the width of the work area; adjusting the alignment of the Project linears, or the locations of poles and spur roads, driving and crushing vegetation as an alternative to blading temporary

roads to preserve the seed bank, and, if necessary, reducing or reconfiguring the layout of the solar arrays to facilitate greater avoidance.

For all other significant impacts, Condition of Certification **BIO-19** allows for compensatory mitigation through land acquisition or qualifying habitat enhancement (restoration) projects. This is consistent with the CEQA definition of "mitigation" (14 Cal. Code Reg. 15370 of the CEQA Guidelines): avoiding; minimizing; rectifying; reducing or eliminating the impact over time; and compensating by providing replacement or substitute resources or environments. **BIO-19** allows for the compensatory mitigation to occur anywhere within the species' range in California, as threats are documented throughout their range. However, most of the species are restricted to the Sonoran Desert region and portions of the eastern Mojave Desert. **BIO-19** includes specific triggers for mitigation of late-season plants detected during the required summer-fall surveys, and specific performance standards and criteria for habitat acquisition and enhancement.

In Condition of Certification **BIO-19**, staff has identified options for mitigation that meet the CEQA definition of mitigation by rehabilitating, repairing, or restoring the affected environment of a resource. Qualifying 'enhancement' options must be designed to 'rescue' an off-site occurrence that is currently assessed with either: a) a long-term population or area decline >30%; b) exhibit an immediate threat that affects >30% of the population, or c) has an overall threat impact that is High to Very High (see NatureServe Threat Ranking system, available online at: <www.natureserve.org/publications/ConsStatusAssess_StatusFactors.pdf**>**. To demonstrate or achieve a 'rescue' of a threatened or declining population, the proposed enhancement must achieve an improvement in the occurrence trend to "stable" or "increasing" status, or downgrading of the overall threat rank to slight or low (from "High" to "Very High").

The impacts of stressors (such as the spread of invasive plants, hydrologic and geomorphic alterations, etc.) on special-status plants are well-documented in the literature. The benefits of restoration and enhancement to rare plant populations have been demonstrated in a variety of projects conducted by public and private land managers, including BLM, National Park Service, The Nature Conservancy, U.S. Forest Service, California State Parks, and the California Native Plant Society. **BIO-19** also includes detailed and specific guidelines for the preparation of enhancement plans. Qualifying enhancement projects include:

1. Controlling unauthorized vehicle or pedestrian use within or adjacent to a special-status plant occurrences. This enhancement project could prevent the direct loss of plants and protect the occurrence from the introduction and spread of noxious weeds (which are typically introduced by vehicles), trampling, soil compaction and its effects on regeneration, or by preventing soil erosion/sedimentation associated with OHV use.

2. Controlling noxious weeds or other invasive pest plants. The spread of non-native plants in wildlands is second only to habitat loss as a primary cause of decline of many special-status plants. Weeds out-compete, and eventually displace native plants for moisture and nutrients or impact them through shading or allelopathic chemicals, or increases in the frequency and intensity of fires. They can also affect

rare plants indirectly by stabilizing dune habitats prematurely and disrupting the geomorphic and hydrologic processes that support them.

3. Eliminating grazing by wild burros or livestock. This land use directly harms rare plant occurrences through trampling and soil compaction, encouraging the spread of invasive or non-native plants, and altering hydrology by eroding and incising washes.

4. Restoring critical lost or degraded hydrologic or geomorphic functions to known special-status plant occurrences that have lost historic sheet flow or instream flows, as a result of diverting washes upslope by roads or ditches. In addition to the loss of water, the loose sands and natural disturbance process may be equally important for germination. Obstruction of the aeolian (wind-blown) sand transport systems from artificial structures (buildings, fences) indirectly but acutely impacts rare plants dependent on fine wind-blown sands and the natural disturbance process.

In lieu of acquiring lands or implementing enhancement projects itself, the Project owner (subject to approval by the Compliance Project Manager) may satisfy the requirements of the mitigation measure for acquisition by depositing funds (equivalent to the cost of acquisition or enhancement) into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF) or other qualified third party. The Project owner must commit to the terms and conditions of **BIO-19,** and the Energy Commission, through the Compliance Project Manager, would be responsible for enforcement of the mitigation according to the timeline, monitoring, and reporting requirements specified in the condition. Staff has also included **BIO-29** which allows the Project owner to choose to satisfy its mitigation obligations by paying an in lieu fee instead of acquiring compensation lands for special-status plant species.

Avoidance and Minimization Measures for All Special-Status Plants. Condition of Certification **BIO-19** includes detailed measures for avoiding and minimizing accidental impacts and indirect impacts to avoided plants, including CNPS list 4 (State rank 3) species, during construction, operation, and closure.

Other Mitigation Measures to Address Indirect Effects. A number of additional conditions of certification are required that would minimize direct and indirect impacts to special-status plants. **BIO-14** requires finalizing and implementing the detailed Weed Management Plan, the guidance for which was based on a hybrid of BLM, The Nature Conservancy, USFS, and NatureServe guidelines for management of invasive plants. The avoidance and minimization measures contained in **BIO-1** through **BIO-8** would also benefit special-status plants by protecting the avoided occurrences of Harwood's milk-vetch, Harwood's eriastrum, ribbed cryptantha, desert unicorn plant, and other avoided special-status plants from accidental effects during construction. **BIO-20** requires compensation for impacts to Mojave fringe-toed lizard habitat; the dunes and sand fields that support this species also support several special-status plants. **BIO-22** (Mitigation for Impacts to State Waters) requires acquisition of desert washes and desert wash woodland and permanent protection of the acquired habitat from future development. Desert washes provide essential habitat for a number of late-season special-status plants. **BIO-7** (preparation of BRMIMP) would ensure implementation of

all mitigation measures under a mitigation monitoring plan and enforced under the authority of the CPM.

Staff's Condition of Certification **BIO-24** requires the applicant prepare a Revegetation Plan to restore all areas subject to temporary disturbance to pre-Project grade and conditions. To the extent practical and as part of this Revegetation Plan, the Applicant would salvage native desert plants during construction of the Project and would use the salvaged plants for revegetation of temporarily disturbed areas. The Revegetation Plan would address the salvaging of cacti, native trees, and topsoil during initial vegetation grubbing of the Project site, as well as proper storage of salvaged plant material and seed collection, replanting of salvaged materials, and monitoring parameters including revegetation success criteria and performance standards for salvaged materials.

Cacti, Yucca, and Native Trees

The 2009 and 2010 surveys also included an inventory of native cacti, succulents and native trees that are not considered rare (e.g., they are not tracked by CNDDB or included on the CNPS special-status plant lists) but the harvesting of these native plants is regulated under the California Native Plant Protection Act (Fish and Game Codes 1900-1913) and the California Desert Native Plant Act of 1981 (i.e. Food and Agricultural Code 80001, et . seq. and Fish and Game Codes 1925-1926), and prevent unlawful harvesting of non-listed native desert plants of the state (see **Biological Resources Table 1)**.

The Applicant conducted stratified sampling plots for cacti, yucca, and native trees in the Study area and found that two cacti species (beavertail cholla and Wiggins cholla, although the latter is no longer believed to be a valid taxon) and three tree species (palo verde, cat-claw acacia, and ironwood) occur within the Project area. Other cacti and native trees identified during field surveys include buckhorn cholla (*Cylindropuntia acanthocarpa*), silver cholla (*C.=Opuntia echinocarpa*), pencil cholla (*C.=Opuntia ramosissima*), ocotillo (*Fouquieria splendens*), fish-hook cactus (*Mammillaria tetrancistra*), honey mesquite (*Prosopis glandulosa*), and smoke tree (*Psorothamnus spinosus*) (GSEP 2009a, Appendix C Biological Resources Technical Report). To the extent practical, the Applicant would salvage native desert plants during construction of the Project and would use the salvaged plants for revegetation of temporarily disturbed areas. The Applicant has prepared a draft Revegetation Plan that addresses the salvaging of cacti and native trees during initial vegetation grubbing of the Project site, as well as proper storage of salvaged plant material and seed collection, replanting of salvaged materials, and monitoring parameters including revegetation success criteria and performance standards for salvaged materials (TTEC 2010i). Staff's Condition of Certification **BIO-24** requires the applicant to prepare and implement a Revegetation Plan which would address the salvaging of topsoil and native desert plants to aid in the revegetation of temporarily disturbed areas following Project construction.

Impacts to Groundwater-Dependent Vegetation During Construction and Operation

Project pumping during construction and operation could lower groundwater levels (**Soil and Water Resources**, Section C.7.4.2.3) which could have a significant impact if it lowered the water table below the reach of the deep-rooted, groundwater-dependent

plants ("phreatophytes") that are within the Project pumping impact zone. This zone includes an area extending 2 to 3 miles from the Project pumping well during construction and approximately 10 miles by the end of Project operation (Worley Parsons 2009, Figure 3).

The Applicant predicted that the maximum drawdown in the shallow water table (the water table that supports phreatophytes) associated with the Project is approximately 0.3 feet in the area of the pumping well. The area where drawdown exceeds 0.25 foot is limited to within approximately 2.5 to 3.5 miles of the Project wells (see **Soil and Water Figure 16**). The Applicant's analysis showed a minor drawdown in the deep water aquifer of 0.5 foot as much as 10 miles away at the end of Project operation (33 years); drawdown in the shallow aquifer would be considerably less (Worley Parsons 2009, Figure 3).

The proposed groundwater pumping is not expected to significantly affect the health or status of the creosote bush scrub, which dominates the drier portions of the valley floor and surrounding alluvial fans and pediments, because this plant community is hundreds of feet above the groundwater level. These drought-adapted and shallow-rooted species are supported by precipitation, not shallow or deep groundwater. The phreatophytic communities potentially affected by the proposed Project are described below.

Groundwater-Dependent Plants and Communities in the Project Pumping Zone

Phreatophytes are groundwater-dependent plants with deep root systems that can extend tens of feet below the ground surface to the underlying water table. The communities of desert phreatophytes found in the 10 mile radius around the Project pumping well include mesquite bosques, bush seep-weed-dominant chenopod scrubs (succulent chenopod scrubs), and ironwood and palo verde woodlands (microphyll woodlands). The dune scrubs occurring in areas of near-surface groundwater may also be affected by lowered groundwater tables. All of these communities are designated as rare natural communities by the CNDDB (CDFG j2003) and the desert dry wash woodland (a microphyll woodland), chenopod scrubs, and dune habitats are recognized sensitive plant communities in the BLM NECO Plan (BLM CDD 2002).

Ground waters are important to sustain vegetation for wildlife habitat in some areas where surface waters are not present (RWQCB 2006). Special-status wildlife has been documented within these phreatophytic communities in the Project area and around Palen Dry Lake including Mojave fringe-toed lizard, American badger, western burrowing owl, desert kit fox, and loggerhead shrike (GSEP 2009a; Solar Millennium 2009a). Two special-status plants, jack-ass clover and Palmer's jack-ass clover, occur among the mesquite dunes around Palen Dry Lake and are known from only a few occurrences in California (CNDDB 2010; Silverman pers. comm.). Numerous rare plants were observed in the playa dunes and drifts at the southern tip of the lake (AECOM 2010d), including a new species of saltbush (*Atriplex* sp. nov. J. Andre).

The Applicant based its assumptions that no phreatophytes would be affected on the results of a reconnaissance-level assessment of the large stand of mesquite bosque at the northeast end of Palen Lake (TTEC 2009d). However, staff found documentation of smaller stands of mesquite bosque at the southwest end of the lake (Evans & Hartman 2007) and observed the mesquite stands on recent aerial photos. Additionally,

phreatophytic plant communities dominated or co-dominated by bush seep-weed (a phreatophyte) are found south of Palen Lake sporadically along the southwest margins of Ford Dry Lake (AECOM 2010a) within the end-of-operation Project pumping zone, a 10-mile radius around the Project well. Staff expects that the effects of the proposed Palen project pumping well (AECOM 2010a) would be greater and be felt as much as a decade sooner than the end-of-operation effects of the Genesis Project.

Closer to the Project around Ford Dry Lake, the Applicant noted communities co-dominated by bush seep-weed and allscale (a xerophyte), with scattered woody phreatophytes such as blue palo verde and ironwood (TTEC 2009d). It is uncertain whether the phreatophytes around Ford Dry Lake are supported by the basin aquifer (from which the Project would draw its water) or mountain front aquifer, which the Applicant has stated would be essentially unaffected by pumping from the deeper—and at least partially contained—basin aquifer. Shallow water tables at Ford Dry Lake were measured at 80 feet in depth in the test well on site. Almost 10 miles away at Palen Dry Lake, the groundwater is considerably shallower, particularly at the northeast end of the lake. At the old growth ironwood forest in the Palen wash, approximately 5 miles north of the Project site, the predicted water table drawdowns are in the range of 0.05 to 0.2 feet (See **Soil and Water Figure 16**).

Groundwater can also be held near the ground surface in dune systems through capillarity and can influence both the vegetative cover and the morphology of the dunes. Recent research in New Mexico has confirmed that groundwater is one feature that influences dune morphology; dune fields are shaped by feedback between aeolian dynamics and groundwater chemistry (Langford et al. 2009). Consequently, some dune scrubs, if present in the dunes off the northeast corner of the Palen project where the groundwater is much nearer to surface than Ford Dry Lake, could also be affected by a drop in groundwater levels if the levels drop below the effective rooting depth of these shallower rooted species.

Preliminary investigations conducted at the Project site suggest that the aquifer that is proposed for development is under confined to semi-confined conditions and is separated in part from the shallow alluvial groundwater system by low permeability sediments (Worley Parsons 2009). Correspondingly, the Applicant's assessment of impacts to these layers is based on the assumption that the confining layers are laterally continuous and maintain hydraulic separation away from the proposed pumping wells. Staff, however, is concerned about the level of uncertainty in such a prediction and the potential influence of groundwater pumping in the shallow aquifer if the low permeability layers are fractured, as they often are (Deacon et al 2007).

Groundwater-Dependent Plant Responses to Lowered Groundwater Levels

A plant affected by competition for water displays signs of stress (e.g. Manning and Barbour 1988), and stress can be manifested as anything from diminished physiological processes to plant death. Shallower rooted herbs are the first affected and least able to withstand drought-stress; deep-rooted woody phreatophytes (such as mesquite) can take decades to die. Staff expects that stress to woody species, such as mesquite, from declines in groundwater levels would be detected in measures of plant vigor, such as die-back, long before plant cover changes might be measurable in an aerial photo. As

Elmore et al. (2006) and Manning (2007) show, total live plant abundance (plant cover) on a site decreases as the water table is lowered. This in turn increases wind and water erosion to soil, and the void left behind by the receding native plants is often colonized by invasive exotic plants (Patten et al 2007; Lovich 1999; Manning 2006). Lowering the local water table from groundwater pumping has also been demonstrated to induce habitat conversions (Manning 2006; 2007). Even modest drawdowns of 0.3 feet can adversely affect vegetation if groundwater drops below the effective rooting level; if the drop is sustained (so that plants never have an opportunity to recover); or if the groundwater lowering occurs not just in summer (when plants are dormant) but also occurs throughout early spring when plants need and utilize water most (Manning pers. comm.).

Increased soil erosion induced by the decreasing vegetative cover leads to a loss of nutrients, minerals, and the structure necessary for seed germination of plants that are adapted to prior groundwater conditions on the site. Non-native opportunistic “weed” species (e.g., Russian thistle) are better adapted to nutrient-poor soils and a wider variety of soil moisture regimes or conditions, and demonstrate a competitive edge. Animals, including mammals, reptiles, birds, and invertebrates, who may require certain plant species or a certain vegetation structure, may no longer find suitable food or living space. Local extirpations are compounded if the displaced animal is an important food source for another animal. The complex below-ground systems of bacteria, algae, and fungi, which provide many valuable ecosystem services (e.g. breakdown of organic matter, nitrogen fixation, carbon storage, and recycling of nutrients), are also disrupted when water tables are lowered. Ultimately, when groundwater levels are lowered beyond the normal reach of groundwater-dependent ecosystems, the decline in plant cover and change in species abundance can result in severe consequences, depending on the organism(s) involved or the prevailing ecosystem processes.

Importance of Spring Water Table in Maintaining Groundwater Dependent Plant Communities

The Applicant stated that water table drawdowns of 0.3 feet or less are similar to or less than expected normal climatic, seasonal, or diurnal water table fluctuations (Worley Parsons 2009). However, inter-annual measurements or averages of water table fluctuations are misleading in predicting the effects of water level declines to groundwater-dependent plant communities, and do not take into account the ecological and physiological traits of arid region plant communities. In forecasting a plant community’s response to lowering groundwater tables, it is necessary to identify the quantity and timing of water availability necessary for healthy ecologic functioning (Eamus and Froend 2006). The extent to which water tables drop during the summer and fall dormant seasons is irrelevant for such forecasts; the only relevant measure of a plant community’s ability to withstand water table declines is the annual water table year-to-year fluctuations in early spring because the growing season is when plants need and utilize water most. In arid regions, most plants are dormant in summer and fall, and measures of fluctuating groundwater levels made during this time will not provide information about the ability of groundwater dependent plant communities to withstand reduced water tables. If, for example, water tables in April were reduced to the low levels associated with summer and fall (as a result of groundwater pumping), then adverse consequences would be expected (Manning pers. comm.) Groundwater

dependent ecosystems experience measurable plant losses and other adverse changes when water tables fail to fully.

Conclusions and Mitigation

As discussed in subsection C.7.4.2 in the **Soil and Water** section, the calculations and assumptions used to evaluate potential Project impacts to groundwater levels are imprecise and have limitations and uncertainties associated with them. It is also unclear how extended droughts associated with climate change could exacerbate the effect of the Project's drawdown. Given the uncertainties associated with groundwater analyses, particularly those based on a small dataset, and the combined effect of droughts and the Project's drawdown, the magnitude of potential Project impacts that could occur to groundwater dependent plant communities cannot be determined precisely. To ensure that the Project's proposed use of groundwater does not significantly impact the groundwater levels in the Project area to the extent that biological resources are significantly and adversely affected, staff recommends that the Project owner monitor the groundwater-dependent vegetation within the 10-mile zone of effect. Proposed Condition of Certification **BIO-25** includes detailed specifications for the design and implementation of a Groundwater-Dependent Vegetation Monitoring Plan (Plan). Aside from the monitoring requirements in **BIO-25**, no mitigation is proposed unless adverse effects are detected. Triggers for mitigation and performance standards are specified in Condition of Certification **BIO-26.** -

The "Project pumping zone at end of Project Operation" depicted in Figure 3 of the cumulative effects analysis in the technical memorandum *Groundwater Resources Cumulative Impact Analysis for Genesis Solar Power Project, Riverside County, CA* (Worley Parsons 2009), is an approximate 10-mile radius area centered on the Project pumping well. After reviewing the groundwater analysis and pumping zone for the Palen Solar Power Project, it appears there may be an overlap between the Project's pumping zone and the northeast corner of the Palen Project's pumping zone (AECOM 2010a, Figures DR-ALT-207-1 & 2). The overlap occurs in close proximity to the proposed Palen Solar Power Project pumping well, and thus the impacts of the Palen Solar Power Project are likely to be felt a decade or more before the impacts of the Genesis Solar Energy Project pumping manifest in an area nearly 9 miles from its pumping well. Staff therefore concludes that the monitoring and adaptive management requirements it has recommended for the Palen Solar Power Project (CEC 2010e) for the same area are adequate to ensure that the groundwater-dependent vegetation at the south end of Palen Lake (near the Palen Solar Power Project) would not be significantly affected. Those measures include detailed specifications and performance standards for annual monitoring to ensure early detection and remedial action in the event that adverse effects are detected.

Project effects would be distinguished from the effects of drought or climate change by comparing monitoring data collected within the area of potential effect (Near-Project Monitoring Sites) to data collected at controls sites in areas not affected by groundwater pumping or hydrologic alterations (Reference Monitoring Sites). The Reference Monitoring Sites would be established within the Sonoran or Colorado Desert regions of California (i.e. regions with similar bi-modal precipitation pattern) and in areas containing examples of the target groundwater-dependent plant communities. Mesquite,

ironwood, and palo verde stands along rivers or dependent on surface flows would not be included, and bush seep-weed communities would only be selected where they occur in sinks on or around the margins of playas. Reference Monitoring Sites should not be selected in areas influenced by groundwater pumping or altered hydrology; national park lands, monuments, and other private and public preserves are good sources for Reference Monitoring Sites.

Baseline data would be collected at all sites prior to the start of pumping, and then data collected annually for the life of the project. A statistician shall be retained to use the first year of baseline data to conduct a “prior power analysis” and evaluate the adequacy of the sampling design. The results of the first year baseline data, prior power analysis, and recommended changes shall be submitted for approval to the CPM by December 31 of the first baseline year.

Staff Condition of Certification **BIO-25** provides guidelines for the development of a detailed, objective-driven Groundwater-Dependent Vegetation Monitoring Plan. **BIO-25** specifies that the Plan be prepared by a qualified plant ecologist and be consistent with guidelines contained in *Measuring and Monitoring Plant Populations* (Elzinga et al. 1998), including: sampling objectives (target/threshold, change/trend-based); attributes measured; field techniques; minimum standards for monitoring personnel; data management; statistical analysis; monitoring schedule; reporting requirements, and responsible parties. Field techniques for measuring drought response include: percent dieback; live crown density; percent cover of live (versus dead) vegetation, percent cover/frequency of associated phreatophytic species; changes over time in percent composition of native versus non-native species, and facultative wetland plants present. Conditions of Certification **SOIL&WATER-3** through **SOIL&WATER-5**, provided in Section C.7.12, specifies sampling and reporting guidelines for groundwater level monitoring. The primary objective for the monitoring is to establish pre-construction and Project related groundwater levels and water quality trends that can be quantitatively compared against observed and simulated trends near the Project pumping wells and near potentially impacted existing wells. **SOIL&WATER-5** also specifies monitoring of area seeps and springs within a mile of the Project well.

Water table depths must be measured in early spring (March 15- April 1) to assess water table conditions, project summer vegetation conditions, and compare the effects of pumping or runoff from one year to the next (Manning 2006). Normal year-to-year variability in spring water tables can be projected from a review of historical data from area well logs. The analysis would also compare estimated to actual water table declines and perform a statistical trend analysis to refine future predictions of effect. If a decline in plant vigor (that is not also detected at the Reference Monitoring Sites) and changes in the spring groundwater levels and are detected, then remedial action would be implemented according to the specifications in staff proposed Condition of Certification **BIO-26.** The threshold for remedial action would be based on an analysis of: 1) groundwater-dependent vegetation (measures of plant vigor, compared against the control sites); 2) data on water usage and its effects on the water table at the Project pumping well, and; 3) the indirect effects of project pumping on water tables from area wells within the Project pumping zone.

If the analysis detects: 1) declining spring water tables—in any amount greater than the normal year-to-year variability—combined with 2) indicators of a decline in plant vigor, that 3) are not detected in the Reference Monitoring Sites, then the Applicant would prepare a detailed proposal for remedial action. The analysis and proposal must ~~c~~ restore the spring groundwater tables to a baseline level to sustain healthy ecological functioning in the affected plant communities, as defined by the trigger described above~~,~~ and informed by data on Project water usage. The Applicant may choose the most feasible method of accomplishing this, providing it meets the performance standard above. Remedial measures must include one of the following measures to meet the performance standard of restoring the spring groundwater tables to baseline levels: 1) Relocating the Project pumping well to another location farther from the groundwater-dependent vegetation (and where the dependent vegetation is no longer within the drawdown cone of depression), or—alternatively—constructing a new well farther away and reducing water usage in the well closest to the dependent plant communities; 2) Reducing the Project water usage through water conservation methods or new technologies.

Relocating the Project pumping well farther from the affected groundwater-dependent vegetation would address the impact by reducing or eliminating groundwater use in the vicinity of the phreatophytic communities; the influence of the well on groundwater decreases with distance. There is relatively little vegetation of this kind in the valley as it occurs only in areas with a relatively shallow water table (e.g., less than approximately 100 feet in depth). It occurs around the margins of the two dry lake beds. Staff does not expect that the groundwater usage would affect the ironwood forest in Palen Wash, or the ironwood and Palo Verde trees that occur along the many washes leading to the lakebeds; however, staff has insufficient data on which to base such an assumption. Staff therefore recommends that the monitoring of vegetation prescribed under **BIO-25** include a representation of the ironwood and Palo Verde stands in the valley and on Palen Wash, where they occur within the estimated 9 to 10-mile zone of potential effect (at end of operation).

Based on the performance standards for remedial action described above, staff has concluded that with implementation of Conditions of Certification **BIO-25** and **BIO-26**, impacts to groundwater-dependent plant communities would be reduced to less than significant levels.

Project Closure and Decommissioning

The Applicant submitted a Draft Decommissioning and Closure Plan (Worley Parsons 2010b) in response to staff's data request for a conceptual decommissioning plan that addressed the fate of the engineered channels and reclamation of the site to native plant communities (CEC 2009d). Staff requested a conceptual plan for filling the re-created channels and restoring drainages on the Project site, including a description of a revegetation plan for restoring the function and values of the ephemeral drainages. Staff also requested a cost estimate, adjusted for inflation, for implementing the closure, including the revegetation component of the closure activities for the drainages, and asked for a conceptual plan and funding mechanism for monitoring and maintenance of the ephemeral drainages until existing functions are reestablished.

The Applicant's Draft Decommissioning and Closure Plan (Worley Parsons 2010b) provides some of the information requested by staff, but does not include a conceptual revegetation plan that could be used to guide reclamation of the Project site after closure and decommissioning, nor does it provide sufficient information to develop an estimate of the funding needed for those activities.

Regulations promulgated by BLM at 43 CFR 3809.550 et seq. require a more detailed reclamation plan and a funding estimate. Page 5 of BLM's Instructional Memo for Oregon/Washington BLM Policy for 43 CFR 3809 Notice and Plan-level Occupations, 43 CFR 3715 Use and Occupancy and Reclamation Cost Estimates (BLM 2009b) lists the requirements for a reclamation plan as follows:
"(c) Reclamation Plan. A plan for reclamation to meet the standards in §3809.420 with a description of the equipment, devices, or practices proposed for use including, where applicable, plans for:

i. drill-hole plugging;

ii. regrading and reshaping;

iii. mine reclamation, including information on the feasibility of pit backfilling that details economic, environmental, and safety factors;

iv. riparian mitigation;

v. wildlife habitat rehabilitation;

vi. topsoil handling;

vii. revegetation;

viii. isolation and control of acid-forming, toxic, or deleterious materials;

ix. removal or stabilization of buildings, structures, and support facilities; and

x. post-closure management."

Page 3 of the same document also explicitly requires an estimate of the costs of reclamation, as follows:

> "*Reclamation Cost Estimate. An estimate of the cost to fully reclaim disturbances created during the proposed operations as required by §3809.552. The reclamation cost estimate must be developed as if the BLM were to contract with a third party to reclaim the operations according to the reclamation plan*."

Staff's proposed Condition of Certification **BIO-23** requires the Applicant to develop a Decommissioning and Closure Plan and cost estimate that meets the requirements of BLM's 43 CFR 3809.550 et seq. Staff acknowledges the uncertainty in planning for conditions 30 to 50 years in the future, but the Decommissioning and Closure Plan cannot defer establishing reasonable performance standards and goals until that time. The plan must explicitly state that the goals of reclamation include restoration of the site's topography and hydrology to a relatively natural condition and restoration of native

plant communities. The plan must also provide guidelines for developing milestones and specific, quantitative success criteria for parameters such as native plant density and diversity and percent cover for weeds, thresholds that would trigger remedial actions, and information about what those remedial actions would be. The plan should also provide an approximate outline and schedule for monitoring the success of the reclamation effort. Staff recommends that the reclamation plan establish at least a 10-year monitoring period to achieve revegetation success criteria because of the slow pace of restoration in a desert environment.

Reasonably Foreseeable Development Scenario: Southern California Edison Colorado River Substation

This subsection provides an overview of potential impacts to biological resources from construction of Southern California Edison's (SCE's) proposed 230 kV expansion of the already-permitted (but not yet constructed) 500 kV Colorado River Substation. Unlike the transmission line that would go from the Project power plant to the Colorado River Substation (the “gen-tie”) SCE's Colorado River Substation is not part of the Genesis project description. Rather, SCE would acquire a permit from the California Public Utilities Commission, and would construct, own and operate the Colorado River Substation to serve several projects in the area. SCE would provide an analysis of impacts to biological resources and mitigation for those impacts resulting from construction of the Colorado River Substation. However, because the proposed expansion of the Colorado River Substation is a reasonably foreseeable development, a description of the expansion and potential impacts to biological resources is included here. The purpose of the discussion in this subsection is to inform all interested parties of the potential for impacts to biological resources that may result from other actions related to the Genesis Project.

Project Description

Southern California Edison (SCE) proposes to construct the Colorado River Substation Expansion to interconnect solar development projects in the Blythe area to SCE’s previously approved Colorado River Substation. The substation site was one of three sites analyzed in the Devers – Palo Verde No. 2 500 kV Transmission Line Final Environmental Impact Statement /Environmental Impact Report, which was approved by the California Public Utilities Commission in January 2007 (TTEC 2010p). The Colorado River Substation would be located on an approximately 140-acre parcel of land with the substation generally located in the eastern portion of the parcel (TTEC 2010p).

The Colorado River Substation Expansion Project involves expanding the already approved 500 kV switchyard, which would occupy approximately 45 acres, into a full 500/220 kV substation on approximately 90 acres of land (TTEC 2010p). The expansion project would involve site preparation by clearing existing vegetation and grading, and may involve redirecting surface flows around one side of the substation (TTEC 2010p). No final drainage or grading plans have yet been prepared, but it may be necessary to redirect surface water flow around one side of the substation (TTEC 2010p). These drainage alterations would potentially disturb an area approximately 80 feet wide around three sides of the fenced in substation, resulting in a total permanent disturbance area of approximately 20 acres (TTEC 2010p). Internal surface runoff would be directed towards an approximately 120-foot by 200-foot detention basin located at the south end

of the substation. An approximately 10-acre staging area adjacent to the expansion site may be necessary for construction (TTEC 2010p). Although detailed engineering, grading and drainage plans are not yet available, it is estimated that the total area subject to permanent disturbance from construction of the substation expansion would be approximately 65 acres (45 acres for substation grading, 20 acres for drainage/side slopes), plus temporary disturbance resulting from a 10-acre staging area (TTEC 2010p, Table 2).

Impacts to Biological Resources from Colorado River Substation Expansion

Staff has little project-specific information regarding the habitat types that would be permanently or temporarily impacted by the Colorado River Substation expansion, but infers that it would be constructed within sand dune habitat. The basis for this inference is Figure DR-BIO-51-2 from the Data Response submitted for the Blythe Project (AECOM 2010e). This figure shows, at a scale of 1 inch = 6000 feet, the approximate location of the proposed Colorado River Substation and depicts it as being entirely within stabilized and partially stabilized sand dune. Supporting staff's inference that the substation expansion will be in sand dunes is the Applicant's submittal which included the 2010 preliminary survey results from the Blythe Project (TTEC 2010o, Attachment A). This submittal showed numerous records for species that occur on sand dune habitat (for example Mojave fringe-toed lizard and ribbed cryptantha) in and around the proposed Colorado River Substation location.

Based on the information from the Blythe Project 2010 surveys (TTEC 2010o, Attachment A, Figure 2 - Preliminary Results Botany Rare Plants Spring 2010 Surveys, and Figure 4 - Incidental Wildlife Observations Spring 2010 Surveys) staff has concluded that Mojave fringe-toed lizards and a number of other sensitive sand dune-dependent species are likely to be directly impacted by expansion of the Colorado River Substation. Many Mojave fringe-toed lizards were detected in and near the proposed Colorado River Substation, as well as numerous rare plants, including Harwood's eriastrum, Harwood's milk-vetch, winged cryptantha and ribbed cryptantha.

Harwood's eriastrum, a California endemic and BLM Sensitive species, has a global distribution restricted to the southeast corner of California, and it is known from only 14 documented locations. As described above in the subsection on impacts to special-status plants, direct or indirect impacts to Harwood's eriastrum or Harwood's milk-vetch would be significant. Late summer/fall botanical surveys might also reveal the presence of additional sensitive plant species in the vicinity of the proposed substation expansion. BLM requests 100 percent avoidance for BLM sensitive species such as Harwood's eriastrum (Lund pers. comm.).

Even if the substation expansion avoided direct impacts to these sensitive sand dune species, indirect impacts are also likely to occur. Alterations in drainages could adversely affect special-status plant populations that occur downstream of the project area. Other indirect effects include the spread of the non-native Sahara mustard and other non-native invasive species, which degrade sand dune habitat by prematurely stabilizing dunes. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas could also adversely affect sand dune dependent plant and animal species.

No desert tortoise were detected in or within the one-mile buffer around the proposed substation during the 2010 surveys (TTEC 2010o), but given the proximity of good habitat in the immediate vicinity of the proposed substation desert tortoise could occur in or near the proposed substation expansion and could be directly or indirectly impacted. Transmission line maintenance activities and an increase in OHV use from the construction of roads into previously inaccessible areas could result in increased disturbance from human intrusions and increased risk of mortality from vehicle strikes and crushing of burrows. Construction activities and addition of new perching structures such as transmission poles and lines could result in increased raven numbers, and hence an increase in desert tortoise predation. Road construction could also increase the opportunities for non-native invasive plant species, with adverse effects to native plant and wildlife communities. Nesting birds, badger, kit fox, and burrowing owls could also be directly or indirectly affected by construction and operation of the expanded substation. Staff does not have information about the presence of ephemeral washes, desert dry wash woodland and other waters of the state in the proposed substation expansion area. The proposed expansion and associated drainage modifications could result in direct and indirect impacts to state waters.

Staff has concluded that SCE's proposed expansion of the Colorado River Substation has the potential to result in significant direct, indirect and cumulative impacts to biological resources, in particular for sensitive dune-dependent plant species such as Harwood's eriastrum. Avoidance, minimization and compensation measures such as those described in staff's proposed Conditions of Certification **BIO-19** could potentially reduce these impacts to less than significant levels. However, implementation of the avoidance measures described in these conditions of certification would require site-specific information about the location of proposed project features in relation to sensitive plant species. Staff does not currently have that project-specific information and therefore cannot address the feasibility of implementing effective avoidance measures as a means of reducing significant impacts.

C.2.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the Proposed Project, including a 125 MW solar facility located within the boundaries of the Proposed Project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the Proposed Project area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1** in the Alternatives section.

The Reduced Acreage Alternative would have a net generating capacity of approximately 125 MW and would occupy approximately 1,080 acres of land. This alternative would retain 50 percent of the Proposed Project's generating capacity, and would affect 50 percent of the land affected by the Proposed Project. Specifically, the alternative would retain the Unit 1 solar field, including the construction parking, construction trailers, and temporary construction laydown area; the administration building and warehouse; the solar collector assembly area; the western evaporation pond area (approximately 24 acres); and the land farm area (approximately 10 acres).

The alternative would require relocating the switchyard, from the Unit 2 power block to the Unit 1 power block. The eastern evaporation pond area (approximately 24 acres) that corresponds with Unit 2 would not be included in the Reduced Acreage Alternative. This area could be used for the relocated gas yard if needed.

Similar to the Proposed Project, the Reduced Acreage Alternative would transmit power to the grid through the Colorado River Substation. It would require infrastructure including groundwater wells, transmission line, road access, administration building, and evaporation ponds. The required infrastructure and transmission line for the Reduced Acreage Alternative would follow the routes defined for the Proposed Project, even though Unit 1 would not be constructed. The linear facilities would require approximately 90 acres. The gas pipeline would be approximately 1 mile longer than for the Proposed Project.

Dry cooling is being evaluated as an alternative to the Proposed Project, so could also be used with this configuration; however, if wet cooling were retained, water usage for the Reduced Acreage Alternative would be approximately 822 acre-feet per year.

C.2.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the Proposed Project. It simply eliminates approximately 800 acres from the Proposed Project. As a result, the environmental setting is similar to that of the Proposed Project (see **Biological Resources Table 7**). There are fewer acres of unvegetated ephemeral dry wash, stabilized and partially stabilized sand dune, and Sonoran creosote bush scrub plant communities. However, there are similar acres of playa and microphyll woodland, in part because the linear facilities route is the same for the Proposed Project and the alternative.

C.2.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The smaller Reduced Acreage Alternative would have smaller impacts on many of the biological resources within the Project area, including desert tortoise habitat, unvegetated ephemeral dry washes, and migratory birds. The Reduced Acreage Alternative would have substantially less impact on Mojave fringe-toed lizard habitat both because of a decrease in impacts to stabilized and partially stabilized sand dunes and because the Reduced Acreage Alternative does not extend into the sand transport corridor, and therefore has no indirect downwind impact to sandy habitats outside of the Disturbance Area (**Biological Resources Table 8)**. In addition, the Reduced Acreage Alternative would use approximately 50 percent less groundwater than the Proposed Project, though it would still use a substantial amount. Both the Proposed Project and the Reduced Acreage Alternative would impact groundwater-dependent ecosystems through this use of groundwater. Because the linear facilities for the Proposed Project and the Reduced Acreage Alternatives share the same route, impacts associated with this corridor are very similar. Impacts to Couch's spadefoot toad and microphyll woodland remain the same for both the Proposed Project and this alternative for this reason. In addition, although the Reduced Acreage Alternative does represent fewer acres of impacts, it is the same overall length as the Proposed Project, and therefore indirect impacts to desert washes that currently flow through the area remain similar.

Staff considers direct, indirect, and cumulative impacts from the Proposed Project and the Reduced Acreage Alternative similar (aside from differences in impact acreage) for most impacts associated with the Proposed Project including to desert tortoise habitat, Couch's spadefoot toad, microphyll woodland, and migratory birds. While impacts from the Reduced Acreage Alternative are substantially less to Mojave fringe-toed lizard habitat and desert wash, these impacts would still be considered significant under this alternative as well as under the Proposed Project and Dry Cooling Alternative. Staff currently has insufficient information to fully assess indirect and cumulative impacts to groundwater-dependent vegetation, but these impacts may be considered significant under the Proposed Project and the Reduced Acreage Alternative.

Proposed conditions of certification under the Reduced Acreages Alternative are identical to those for the Proposed Project, except that the compensatory mitigation acreages recommended for desert tortoise habitat (staff's proposed Condition of Certification **BIO-12**), western burrowing owl (staff's proposed Condition of Certification **BIO-18**), sand dunes (staff's proposed Condition of Certification **BIO-20**), Mojave fringe-toed lizards (staff's proposed Condition of Certification **BIO-20**), and state waters (staff's proposed Condition of Certification **BIO-22**) are adjusted to reflect the reduced areas of impacts. Aside from the pending issue related to groundwater-dependent ecosystems, staff concludes that with implementation of these conditions, impacts from this alternative, as with the Proposed Project, would be less than significant.

C.2.5.3 CEQA LEVEL OF SIGNIFICANCE

Direct, indirect and cumulative impacts of the Reduced Acreage Alternative to desert tortoise, Mojave fringe-toed lizard, and other special-status species, as well as sensitive biological resources such sand dunes and desert washes are significant, as with the Proposed Project.

Biological Resources Table 7
Comparison of Impacts to Vegetation Communities from the Proposed Project and Reduced Acreage Alternative*

	Proposed Project/Dry Cooling Alternative (acres)	Reduced Acreage Alternative (acres)
Riparian – Direct Impacts[1]		
Microphyll woodland	16	16
Unvegetated, ephemeral dry wash	74	51
Riparian – Indirect Impacts[2]		
Unvegetated, ephemeral dry wash	21	21
Total State Waters	*111*	*88*
Upland[3,4]		
Sonoran creosote bush scrub	1,773	1,039
Playa and sand drifts over playa	37	44
Stabilized and partially stabilized desert dunes	1	1.3
Total Upland	*1,811*	*1,083*

* Reflects revised acreage impacts from TTEC 2010o

1 Proposed Project: From the memo "Revisions to Jurisdictional Waters for the Genesis Solar Energy Project" (TTEC 2010l).
Reduced Acreage Alternative: Estimate only - from TTEC 2010l, with the area impacted by Unit 2 removed.

2 Proposed Project: From Appendix D, Lake and Streambed Alteration Agreement Application (TTEC 2009d); the Reduced Acreage Alternative intercepts the same features as the Proposed Project, and therefore indirect impacts would be the same.

3 Proposed Project: From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities").
Reduced Acreage Alternative: Estimate only - from **Biological Resources, Appendix A** and linear facility acreages included in CEC 2010d).

4 *From TTEC 2010o (Tetra Tech memo "Minor Changes to the Genesis Solar Energy Project Description: 6-pole Extension of Transmission Line; Inclusion of Distribution and Telecommunications Line; Removal of "Toe" Area from Plant Facility").*

Biological Resources Table 8
Comparison of Mitigation Requirements for Proposed Project and Reduced Acreage Alternative*

Resource	Mitigation Ratio	Proposed Project/Dry Cooling Alternative (acres)	Reduced Acreage Alternative (acres)
Microphyll woodland – Direct Impacts	3:1	48	48
Unvegetated, ephemeral dry wash – Direct Impacts	1:1	74	51
Unvegetated, ephemeral dry wash – Indirect Impacts	0.5:1	10	10
Total state waters mitigation		**132**	**109**
DT habitat within CHU[1]	5:1	115	115
DT habitat outside CHU[2]	1:1	1,749	1,016
Total desert tortoise mitigation		**1,864**	**1,131**
MFTL habitat (sand dunes) – Direct Impacts[3]	3:1	3	4
MFTL habitat (playa and sand drifts over playa) – Direct Impacts	3:1	111	132
MFTL habitat (sand dunes, playa, other) – Indirect Impacts[4]	0.5:1	76	0
Total sand dune/MFTL mitigation		**190**	**136**

*Reflects revised acreage impacts from TTEC 2010m

1 From Application for Incidental Take Permit (TTEC 2009c).

2 Proposed Project: From CEC 2010d (TetraTech table "Anticipated Direct and Indirect Impacts to Vegetation Communities").
Reduced Acreage Alternative: Estimate only, from **Biological Resources, Appendix A** and TTEC 2009d.

3 Stabilized and partially stabilized sand dunes, see source information for **Biological Resources Table 7**

4 From **Soil and Water, Appendix A** and PWA 2010a**.**

C.2.6 DRY COOLING ALTERNATIVE

There are two types of dry cooling systems: direct dry cooling and the lesser used indirect dry cooling. In both systems, fans blow air over a radiator system to remove heat from the system via convective heat transfer (instead of once-through cooling or evaporative heat transfer). In the direct dry cooling system, also known as an air-cooled condenser (ACC), steam from the steam turbine exhausts directly to a manifold radiator system that rejects heat to the atmosphere, condensing the steam inside the radiator. Direct dry cooling is analyzed as alternative to the wet cooling proposed by NextEra for the Proposed Project.

Dry cooling is the best choice of cooling technologies for a steam power plant to conserve water and minimize wastewater. However, this technology can create both environmental and economic concerns, depending on the location and specific situation.

Advantages and Disadvantages of Dry Cooling

The following is a general list of the general advantages and disadvantages of dry cooling.

Advantages of Dry Cooling Systems

Dry cooling:

- allows a power plant location to be independent of a water source. It has essentially no water intake or water discharge requirements;
- minimizes the use of water treatment chemicals;
- minimizes the generation of liquid and solid wastes;
- does not generate visible plumes that are commonly associated with wet cooling towers;
- eliminates impacts to aquatic biological resources;
- eliminates the need for discharge permits;
- eliminates the need for disturbance of wetland/aquatic substrate habitat.

Disadvantages of Dry Cooling Systems

- Dry cooling requires air-cooled condensers that could have negative visual effects;
- Dry cooling requires the disturbance of a larger area for the air-cooled condensers than that required for cooling towers.
- Dry cooling can have noise impacts that are greater than once-through or wet cooling systems because of the number of fans and the considerably greater total airflow rate. New quieter fans and other mitigation measures are available to reduce these impacts.
- Dry cooling can slightly reduce the power plant steam cycle efficiency and output, depending on site conditions and seasonal variations in ambient conditions. Also, extra power is needed to operate the cooling fans.

- Capital costs for building air-cooled condensers are generally higher than capital costs for once-through cooling.
- While the area required for a dry cooling system would require about 40 to 50 percent more land area than the proposed wet cooling system, from the site layout, it appears that such a system would fit in the approximate current Project location as there is unused space between the power block and the solar collector assembly (GSEP 2009a). This unused space would have been previously graded as it is designed to be used for construction parking and construction trailers. Therefore, this alternative could be located entirely within the boundaries of the Proposed Project.

C.2.6.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the Proposed Project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers in the same location. As a result, the environmental setting would be the same as for the Proposed Project.

C.2.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Because this alternative would occupy the same footprint as the Proposed Project, the impacts remain the same between the two except for impacts to groundwater-dependent ecosystems. The Dry Cooling Alternative would use over 95% less groundwater than the Proposed Project. Indirect impacts to groundwater-dependent ecosystems under the Proposed Project are expected to be significant if the water tables drop below the baseline spring water table levels necessary for healthy ecological functioning. Under the Dry Cooling Alternative, staff expects that impacts to groundwater-dependent vegetation would not be significant.

Staff considers that the direct, indirect, and cumulative impacts from the Proposed Project to desert tortoise habitat, Couch's spadefoot toad, microphyll woodland, and migratory birds would be the same as the impacts to these resources under the Dry Cooling Alternative.

Proposed conditions of certification under the Dry Cooling Alternative are identical to those for the Proposed Project, except that proposed Condition of Certification **BIO-25** (monitoring Project impacts to groundwater-dependent vegetation) and **BIO-26** (Remedial action for adverse effects to groundwater-dependent biological resources) would not be required. Staff concludes that with implementation of these conditions, impacts from the Proposed Project would be less than significant with mitigation. Staff concludes that impacts to groundwater-dependent vegetation under the Dry Cooling Alternative are not significant and no mitigation is recommended.

C.2.6.3 CEQA LEVEL OF SIGNIFICANCE

Direct, indirect and cumulative impacts of the Dry Cooling Alternative to desert tortoise, Mojave fringe-toed lizard, and other special-status species, as well as sensitive biological resources such sand dunes and desert washes are significant, as with the Proposed Project.

C.2.7 NO PROJECT/NO ACTION ALTERNATIVE

C.2.7.1 NO ACTION ON PROPOSED PROJECT APPLICATION AND ON CDCA LAND USE PLAN AMENDMENT

Under this alternative, the Proposed 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 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 impacts to sensitive biological resources. 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 may have some similar impacts in other locations.

C.2.7.2 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAND USE PLAN TO MAKE THE AREA AVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the Proposed 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 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 a result, sensitive biological resources would be impacted from the Proposed Project. Different solar technologies require different amounts of land, placement, grading and maintenance; however, it is expected that all the technologies would require a large use of land. As such, this No Project/No Action Alternative could result in biological resource impacts similar to the impacts under the Proposed Project.

C.2.7.3 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAND USE PLAN TO MAKE THE AREA UNAVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the Proposed 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 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, new impacts to biological resources would not occur, as such, this No Project/No

Action Alternative would not result in impacts to biological resources that would occur 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 may have some similar impacts in other locations.

C.2.8 CUMULATIVE IMPACT ANALYSIS

C.2.8.1 CEQA AND NEPA DEFINITIONS

A cumulative impact analysis is required under both CEQA and NEPA. “Cumulative impact” is the impact on the environment which results from the incremental impact of the proposed Project when considered with other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR §1508.7).

Under CEQA Guidelines, “a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts” (Title 14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is “cumulatively considerable” (Title 14 Cal Code Regs §15130(a)). Such incremental effects are to be “viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects” (Title 14 Cal Code Regs §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.
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). Under NEPA, both context and intensity are considered. When considering intensity of an effect, we consider “whether the action is related to other actions with individually minor but cumulatively significant impacts. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.” (40 CFR §1508.27(b)(7))

Analysis of Cumulative Effects to Biological Resources

Staff used the following steps to develop the cumulative effects analysis described in this subsection:

- Identified the biological resources to consider in the analysis from a review of the impact analysis;
- Defined the geographic Study area for each resource;
- Described the current health and historical context for each resource;
- Identified direct and indirect impacts of the proposed project that might contribute to a cumulative impact;
- Identified other reasonably foreseeable projects that affect each resource;
- Assessed potential cumulative impacts;
- Reported the results; and
- Assessed the need for mitigation.

C.2.8.2 GEOGRAPHIC SCOPE

This cumulative impact analysis includes a broad, regional evaluation of the impacts of existing and reasonably foreseeable future projects that threaten plant and animal communities within the context or geographic scope of the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) (BLM-CDD 2002). The NECO planning area is located in the southeastern California Desert Conservation Area (CDCA). It occurs primarily in the Sonoran Desert region, but includes a smaller portion of the southern Mojave Desert region. For some resources, a different geographic scope was warranted, such as the use of watershed boundaries to analyze cumulative effects to desert washes, or the Chuckwalla Valley region of the I-10 corridor for populations or dune systems restricted to that geographic area.

C.2.8.3 REGIONAL OVERVIEW

This overview of regional impacts is followed by a more detailed discussion of the effects of past, present, and future projects to biological resources of the Project vicinity, with an emphasis on resources found within the Chuckwalla Valley of eastern Riverside County.

The California Desert remained a desolate area for the first few decades of the 20th century. Disturbance was more or less restricted to highways, railroad, and utility corridors, scattered mining, and sheep grazing. In the 1940s, several large military reservations were created for military training, testing, and staging areas. The deserts of eastern Riverside County comprise 40 percent of the County's land area but less than 1 percent of its population. Outside of the small urban-agricultural center of Blythe, near the Colorado River and Arizona border, there are only a few scattered, small residential and agricultural areas between Indio (to the west) and Blythe; most of the lands are in BLM ownership.

Populations of many of the desert's sensitive plants and animals were considered relatively stable until recently, as the push for renewable energy development has placed many populations at risk. Climate change is inarguably one of the biggest environmental challenges of our time and energy developers have submitted project applications that would collectively cover more than one million acres of the region (BLM 2010). However, renewable energy development has its own ecological consequences and portions of the Sonoran and Mojave deserts of California are bearing the brunt of these effects. Poorly planned development could contribute to habitat loss and fragmentation and barriers to species movement and gene flow. Although project permitting and regional planning evaluate basic environmental impacts of such projects, rarely do they consider impacts on connectivity or conduct thorough cumulative effects analyses.

Some of the many sensitive biological resources at risk in the areas identified for renewable energy development in the NECO planning area include desert washes and desert dry wash woodland, desert tortoise habitat, foraging habitat for golden eagle, Mojave fringe-toed lizard, western burrowing owl, American badger, riparian habitat for Le Conte's thrasher and other desert birds in decline, fragile dune ecosystems, burro deer range, the special-status plants Las Animas colubrina and Harwood's milk-vetch, and groundwater dependent vegetation. The Project also lies within a proposed Wildlife

Habitat Management Area (Palen-Ford Wildlife Habitat Management Area). These resources will not only be affected by significant direct and indirect effects from the proposed Project, but will experience similar effects from over 20 reasonably foreseeable future projects within the NECO planning area alone.

The incremental, direct loss of habitat and individuals is more significant when considered with the significant indirect effects of fragmentation, disrupted wildlife movement and connectivity, introduction and spread of non-native plant species, and increases in predators such as ravens. These effects have contributed to population declines and range contractions for many special-status plant and animal species (Boarman 2002a). Combined with the effects of historical grazing and military training, agriculture, and highway and aqueduct construction, the proposed wind and solar energy projects have the potential to further reduce and degrade native plant and animal populations.

C.2.8.4 MAKING CONCLUSIONS ABOUT THE SEVERITY OR SIGNIFICANCE OF THE EFFECT

"No net loss" does not necessarily mean there are no cumulative impacts; the analysis of each resource also describes the indirect and cumulative effects that cannot be quantified through a Geographic Information System (GIS) analysis of habitat impacts. Similarly, even seemingly minor impacts can be significant if they affect an extremely rare or limited resource, and the cumulative impact may be substantial.

For each cumulative effect the following factors were considered in making conclusions about the severity or significance of an effect:

- The health, status, or condition of the resource as a result of past, present, and reasonably foreseeable impacts;
- The contribution of the proposed Project to the overall cumulative impact to the resource;
- The Project's mitigated effect, when added to the effects of these planned future projects; and
- Impact avoidance and minimization: any project design changes that were made, or additional opportunities that could be taken, to avoid and minimize potential impacts in light of cumulative impact concerns.

The standard for a cumulative impacts analysis is defined by the use of the term "collectively significant" in the CEQA Guidelines section 15355; the analysis must assess the collective or combined effect of development. The objective is to avoid underestimating the severity of impacts which, when taken in isolation appear insignificant, but when viewed together appear significant. Cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant merely because the contributions represent a small percentage of the overall problem. Doing so could improperly omit facts relevant to an analysis of the collective effect that the Project and other related projects would have upon biological resources. The result could be approval of projects based on an analysis that avoided evaluating the severity of impacts which, when taken in isolation appear insignificant, but when viewed together appear significant.

C.2.8.5 ANALYTICAL TOOLS AND STUDY LIMITATIONS

This cumulative effects analysis employed a combination of quantitative and qualitative analyses; a Geographic Information System (GIS)-based quantitative analysis for assessing the direct cumulative effects to habitat loss, and a qualitative analysis of the cumulatively considerable indirect effects, based on consultations with agency biologists and regional experts, as well as a literature review of the threats to species and their habitats.

GIS-Based Quantitative Analysis of Habitat Loss

The GIS-based analysis of direct habitat loss was used for this cumulative effects analysis to:

- Identify the overlap between existing and future projects and various biological data layers (e.g. landforms, soils, species occurrences, hydrographic data, vegetation mapping, wildlife habitat models, ownership and management layers);
- Compile digital map information about each resource for purposes of display and analysis; and
- Create statistical tables to summarize the direct impacts to these resources from existing and anticipated future projects, and the Project's contribution to those effects. Information on the datasets used, the sources of the data, and any limitations of the data, are provided in each biological resource section.

Qualitative Analysis of Indirect Effects

GIS is a widely used and effective tool for analyzing large amounts of spatial data, for documenting and quantifying assumptions about direct habitat loss, and the value of the habitat (where habitat models are available). However, the indirect impacts of projects are not easily captured in GIS and thus were only addressed qualitatively. This is important to note because many of these indirect effects (i.e., effects following construction) have greater significance and greater ecological consequences than the original habitat loss. Of particular concern are the effects of habitat fragmentation and its consequences for population viability and the effects of disrupted wildlife movement and connectivity and its effects on gene flow, subjecting populations of species such as bighorn sheep to isolation and inbreeding depression, and reducing their adaptability to climate change.

Other common themes that arose in this qualitative analysis of indirect cumulative effects include: increased vehicle-related mortality; disturbance from noise, lighting and increased human activity; increase in predators such as ravens; spread of invasive non-native plants; downwind effects of facilities and wind fencing on sand transport corridors; bird collisions and electrocutions; climate change and its accompanying increased risk of drought, fire the and spread of invasive exotic plants; and the downstream effects of channel diversions on fluvial sediment transport and riparian vegetation.

Limitations of the Cumulative Project Data and Datasets

The large renewable projects proposed on BLM and private land that made up the dataset of future projects in the cumulative analysis for Biological Resources

(**Biological Resources Table 9**) represent only those projects that had applications to the BLM, the Energy Commission, or eastern Riverside County as of January 2010 (the time of the analysis). **Biological Resources Figures 1** and **2** include projects for which staff had no GIS-based shapefiles at the time of the analysis; thus, they were not included in the quantitative analysis. The project list changes frequently; updates to the data used are presented below and in Section B.3.2, **Cumulative Scenario**. Further, not all of the projects shown on the table will complete the environmental review, and not all projects will be funded and constructed. Alternatively, it is possible, even likely, that new projects will be proposed in the near future that are not reflected in this analysis. See Section B.3.2 (Cumulative Scenario) for a discussion on the likelihood of development of the renewable projects on BLM and private lands listed in **Biological Resources Table 9** and illustrated in **Biological Resources Figures 1** and **2**.

This analysis does not compare the loss of individuals to the total known metapopulation; population data are incomplete for many or most species or occurrences and for some species can vary widely from year to year in response to drought.

Finally, in the GIS-based analysis, which requires the use of datasets that encompass the entire geographic scope of the analysis, the Project-specific survey data could not be compared to data for the region that was derived from different methodologies. For example, the Project survey data for waters and habitat is generally based on field surveys. Conversely, the NECO datasets for plant communities and habitats are based largely on aerial photo interpretation. Consequently, the GIS analysis of impacts to plant communities, landforms, and habitats is based on region-wide datasets for those resources (primarily NECO datasets), and not on Project survey data. Acreages listed in the analysis below, for example desert wash woodland or sand dunes may not match the Project-specific survey results. Where there are such differences, they are noted in a footnote to the table or in the summary of a specific analysis. Notwithstanding the challenges presented by comparing region-wide and Project-specific datasets, the GIS-based datasets for vegetation and landforms still provide a powerful and efficient tool for conducting large-scale, region-wide analyses.

C.2.8.6 PROJECTS CONTRIBUTING TO CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

This analysis evaluates the impacts of the proposed Project in addition to the current baseline of past effects, present (existing) projects, and reasonably foreseeable or probable future projects in the I-10 corridor as well as the greater NECO Planning Area. **Biological Resources Figure 1**, located at the end of this section, illustrates the numerous proposed renewable projects on BLM, State and private land in the I-10 corridor between Desert Center and the Colorado River, near Blythe, in eastern Riverside County. **Biological Resources Figure 2** encompasses the entire NECO planning area, an area that is roughly equivalent to the boundaries of the Northern and Eastern Colorado Desert Recovery Unit for desert tortoise. **Biological Resources Table 9** lists the existing and foreseeable future projects (proposed) that were included in the quantitative analysis of cumulative effects. See Section B.4, **Cumulative Scenario Figures 2** and **3** and **Cumulative Scenario Tables 2** and **3** for descriptions of these existing and future proposed projects.

Biological Resources Table 9
Existing and Proposed Future Projects Considered in Cumulative Effects Analysis

Existing Projects (analyzed quantitatively)	ROW Area* (ac)	Foreseeable Future Projects * [Proposed] (analyzed quantitatively)	ROW Area* (ac)
Chuckwalla State Prison	**1,044**	**Genesis Solar Power Project (GSEP)**	**3,001****
Ironwood State Prison	**681**	**Blythe Solar Power Project**	**7,239****
Eagle Mountain Pumping Plant (MDWSC)	**378**	**NextEra Energy – McCoy (**Solar)	**20,560**
Kaiser Mine	**5,772**	**Palen Solar Power Project**	**2,974***
I-10 Corridor (200ft Freeway buffer from CL)	**6,494**	**Bull Frog Green Energy – Big Maria Vista** (Solar)	**22,663**
State highways (50ft Highway buffer from CL)	**2,640**	**Chuckwalla Solar 1**	**4,091**
DPV1 Transmission Line and Existing Access Roads (100ft[5] T-line Tower Buffer; 20ft road width)	**2,861**	**Rice Solar Energy Project**	**3,859**
Landfills(BLM NECO dataset)		**Desert Quartzite** (Solar)	**7,530**
Blythe Energy Project I***	**148**	**Desert Sunlight** (Solar)	**5,119**
BLM Campgrounds – Wiley's Well, Coon Hollow, Cottonwood Spring, and Midland Long-Term Visitor Area	**8,042**	**EnXco 1** (Solar)	**1,325**
BLM Off-Road Vehicle- authorized/designated routes in Meccacopia SRMS. (BLM NECO Human Use LTVAs dataset)	**3,031**	**Chuckwalla Valley Raceway**	**493**
Blythe area urban and agricultural lands (GAP Analysis vegetation dataset)	**88,317**	**Mule Mountain Solar Project**	**6,618**
Desert Center area urban and agricultural lands (2005 NAIP imagery)	**8,424**	**Eagle Mountain Pumped Storage Project**	**252**
Pipeline (NECO pipelines dataset)	**4,392**	**Red Bluff Substation –** for Genesis Solar Power Project	**90**
Projects Considered Qualitatively	**Area (ac)**	**Colorado Substation –** for Blythe Solar Power Project	**44**
Existing		**EnXco 2 Mule Mountain**	**~2,021**
BLM Grazing – Cattle and sheep allotments (Lazy Daisy, Chemehuevi, Rice Valley, and Ford Dry Lake (recently closed)	**n/a**	**Paradise Valley** (Residential "New Town" development)	**6,724**
BLM Multiple Use – Intensive multiple-use classes	**n/a**	**Blythe Airport Solar I Project**	**639**
Gen. Patton military training areas	**n/a**	**Eagle Mountain Landfill**	**1,633**
Colorado Aqueduct – open portions	**n/a**	**Blythe Energy Project II**	**153**
Chocolate Mountains Aerial Gunnery Range	**n/a**	**DPV2 Proposed Roads** (2-foot width) **and towers** (100 sq ft/tower)	**256**
Four approved commercial and 12 residential developments near Blythe	**n/a**	**Genesis Solar Project Access Road**	**29**
Solar Projects at Arizona border	**n/a**	**Blythe Energy Project Transmission Line Towers**	**148**
BLM Renewable Energy Study Areas (future, proposed)	**n/a**		
BLM Transmission Corridors	**n/a**		
		Genesis Solar Project Gas Line (100 foot width)	**85**
		Total Future Projects* 02/05/2010	**339,704 acres**
		Total Existing Disturbances*	**134,750 acres**

* Includes only renewable energy projects that had submitted a Plan of Development (POD) as of the time of the analysis (02/05/2010) and projects for which area data was available. Acreage shown for existing disturbances reflects only those projects for which area data was available.

** Acreage impacts depicted reflect the project footprint only; not the entire ROW. The unused portions of the ROW will be returned to BLM and not included in the final ROW permit
*** UFWS issued a BO for this project in 2001 and it's currently being constructed.
**** Not all of the projects depicted here will complete the environmental review, not all projects will be funded and constructed, and many will not use the entire ROW area.

Project Information Updates

Since **Biological Resources Table 9** was compiled and the GIS analysis conducted, several project changes have occurred, as follows:

- The Altera Black Hills project included in the impact calculations has been denied by the BLM.
- The LightSource Renewables – Mule Mountain II project, which is an active application in to the BLM, was not included in the impact calculations.
- The Pacific Solar Investments – Ogilby project has refined the project boundaries from those used in the impact calculations.

C.2.8.7 ANALYSIS OF CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

Desert Washes/Waters of the State

The geographic scope for the analysis of cumulative impacts to desert washes include: the Chuckwalla-Ford Dry Lake watershed (the watershed encompassing the project) and the entire NECO planning area. The watershed area analysis (**Biological Resources Figure 3**) was based on the USGS National Hydrographic Dataset (2010) within the watershed boundary as defined by the California Interagency Watershed Map of 1999 (California Interagency Watershed Mapping Committee 1999). All figures are provided at the end of the cumulative effects analysis.

The primary hydrologic feature in the watershed is Ford Dry Lake, a depressional sink and dry playa. It is a closed basin, and the receiving basin for 1,504 miles of unnamed desert washes, including the many smaller ephemeral desert washes that pass through the Project site and drain the southeastern flank of the Palen Mountains. The "Palen Wash" is the larger feature that drains the alluvial fan between the Palen and McCoy Mountains. McCoy Spring and an old growth forest of ironwood occur on its upper reaches. The lower reaches of this feature passes through the western portion of the transmission line, natural gas line, and access road alignment.

The Chuckwalla-Ford Dry Lake watershed is relatively unaffected by existing impacts with one notable exception that was not analyzed quantitatively – the construction of I-10 and a series of wing dikes south of I-10. These permanently diverted surface flows from miles of small ephemeral desert washes and desert dry wash woodland north of 1-10, leaving miles of scattered dead ironwood trees and poor creosote bush desert scrub in their wake. Plant cover is very sparse and diversity very low in these affected areas; they are also a testament to the downstream effects that channel diversions, including small channels, can have on both upland and riparian plant communities. For the Project, these effects would be minimized somewhat by the proposed redistribution of flows below the Project into many (not all) of the delineated channels downstream of the

Project, but it is unclear to what extent sediment transport in the diverted channels would be affected.

Portions of the I-10 corridor were also disturbed historically for military training exercises during World War II, and later by jojoba farming and various transmission corridors (gas and electric). There are several large infestations of Sahara mustard in this area but the watershed is otherwise little affected by existing impacts. **Biological Resources Table 10** summarizes the direct loss of desert washes that would result from anticipated future projects within the Chuckwalla-Ford Dry Lake watershed. These effects are also illustrated spatially in **Biological Resources Figure 3.** Proposed future projects would affect approximately 63 miles of desert washes (4.2 percent). Based on the USGS National Hydrographic Dataset (2010) that was used to quantify existing and future impacts throughout the watershed, the Project would affect 2.9 miles (4.6 percent of all future impacts). The ground-based and field-verified delineation of state waters (TTEC 2010l) is provided as a footnote to **Biological Resources Table 10**.

The combined loss of desert washes within the watershed is significant (**Biological Resources Table 10**) but reflects only the direct loss of washes and is only part of the bigger picture of cumulative effects to desert washes. The combined indirect effects to these features from all probable future projects that are not reflected in the quantitative analysis include: impacts to sediment transport from the numerous channel diversions; impacts to wind sand transport processes from the loss of sediment input; impacts to water quality from culverts and road crossings; fragmentation of habitat, and the corresponding loss of habitat function and values.

The combined direct and indirect effects to washes adjacent to dune systems may also have unanticipated consequences to dune habitat and the special-status plants and animals that depend on them. The affected washes around Ford Dry Lake may also be an important contributor to the aeolian and fluvial sand transport systems that maintain the dunes in the Ford Dry Lake vicinity, including stabilized and partially stabilized dunes and sand sheets. The indirect effects of channel diversions and redistribution below the various solar project sites are not well understood but could include deprivation of flows and/or sediment to dependent species, or the introduction and spread of weeds. The downstream indirect impacts of the Project would be minimized, at least in part, through the modifications to the drainage plan to discharge diverted flows into existing large and small flow paths between the Project and Ford Dry Lake (See **BIO-19** (Section A) and **Soil and Water** section for a discussion of Channel Maintenance requirements).

The incremental effects of the Project to desert washes, described above, are cumulatively considerable when viewed in connection with the effects of the past, current and probable future projects included in this analysis (See **Biological Resources Table 9**). With the Project design changes described above and implementation of staff's proposed Conditions of Certification (**BIO-22, BIO-7, BIO-8**, **BIO-14** and **BIO-23**), staff has concluded that the Project's contribution to cumulative impacts to desert washes in the Project's watershed area would be less than considerable. Staff's proposed Condition of Certification **BIO-22** requires compensation through acquisition of desert washes within or adjacent to the Chuckwalla-Ford Dry Lake watershed; **BIO-7** specifies mitigation monitoring and reporting requirements; **BIO-**

8 requires implementing avoidance and minimization measures; **BIO-14** requires finalizing and implementing a detailed Weed Management Plan, and **BIO-23** requires implementing a closure and decommissioning plan for restoring the site topography and hydrology to a more natural condition and revegetating with the locally native species.

Biological Resources Table 10
Cumulative Effects: Desert Washes in Chuckwalla-Ford Dry Lake Watershed

Total Desert Washes* in Genesis Watershed	Impacts to Habitat from Existing Projects** (Percent of total watershed)	Impacts to Habitat from Foreseeable Future Projects*** (Percent of total watershed)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects)
1,503 miles	**13 miles (0.9%)**	**63 miles (4.2%)**	**2.9 miles (4.6%)** (based on USGS dataset)

*Based on the USGS National Hydrographic Dataset (2010) and CalWater Version 2.2.1 (California Interagency Watershed Mapping Committee 1999).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
***The ground-based, field-verified delineation of state waters concluded that 90 acres of desert washes would be directly affected and 21 acres would be indirectly affected downstream of the Project (TTEC 2010l, TTEC 2009d).

Biological Resources Table 11 and **Biological Resources Figure 4** illustrate the potential cumulative impacts to all desert washes within the entire NECO planning area, as depicted in the USGS National Hydrographic Dataset (USGS 2010). Cumulative impacts to desert washes from all foreseeable future projects within the larger NECO planning area are significant. Within NECO, the northern Palo Verde Mesa watershed (near Blythe) and the watersheds immediately north of Highway 62 near Cadiz Valley and Danby Lake are particularly hard-hit by proposed future projects. The cumulative projects' direct effects are compounded by the fact that they also cause impairment of hydrologic, geochemical, geomorphic, and habitat function and values of the remaining reaches downstream of the impact. With the Project design changes described above and implementation of staff's proposed Conditions of Certification (**BIO-22, BIO-7, BIO-8**, **BIO-14** and **BIO-23**) staff concludes that the effects of the Project to desert washes, described above, would be less than cumulatively considerable.

Biological Resources Table 11
Cumulative Effects: Desert Washes in the NECO Planning Area

Total Desert Washes* in NECO	Impacts to Habitat from Existing Projects** (Percent of total washes in NECO)	Impacts to Habitat from Foreseeable Future Projects*** (Percent of total washes in NECO)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects)
18,596 miles	**190 miles (1.0%)**	**1,122 miles (6.0%)**	**2.9 miles (0.3%) (based on USGS dataset)**

*Based on the USGS National Hydrographic Dataset (USGS 2010).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
***The ground-based, field-verified delineation of state waters concluded that 90 acres of desert washes would be directly affected and 21 acres would be indirectly affected downstream of the Project (TTEC 2010l, TTEC 2009d).

Special-Status Wildlife

Desert Tortoise

This analysis addresses cumulative impacts to desert tortoise habitat as defined by the current USGS Desert Tortoise Habitat Model (Nussear et al. 2009). It is a predictive model for mapping the potential distribution of desert tortoise habitat and is useful tool for evaluating different land-use issues that tortoises face at a landscape scale. **Biological Resources Figure 5** is a spatial representation of the predicted habitat potential index values for desert tortoise, based on the 2009 model. The model is not intended to be used, or viewed, as a substitute for ground-based and site-specific field surveys. Model scores reflect a hypothesized habitat potential given the range of environmental conditions where tortoise occurrence was documented. Nussear et al. (2009, p. 15) specifically states:

> "*As such, there are likely areas of potential habitat for which habitat potential was not predicted to be high, and likewise, areas of low potential for which the model predicted higher potential. Finally, the map of desert tortoise potential habitat that we present does not account either for anthropogenic effects, such as urban development, habitat destruction, or fragmentation, or for natural disturbances, such as fire, which might have rendered potential habitat into habitat with much lower potential in recent years*".

GIS-based files for the boundaries of the Eastern and Northern Colorado Recovery Units of the 1994 Desert Tortoise Recovery Plan were not available from the USFWS and the proposed new boundaries as depicted in the USFWS 2008 Draft Revised Recovery Plan had not been adopted as of the time of this analysis. Consequently, the NECO planning area boundary was used for this analysis. The NECO boundary closely approximates the boundaries of the two USFWS recovery units; however, the USFWS boundaries extend slightly to the north and west of the NECO boundary.

The Project's unmitigated effects to desert tortoise habitat (based on the 2009 USGS habitat model) are quantified below in **Biological Resources Table 12** (and **Biological Resources Figure 5**). Most of the proposed projects in the NECO area would impact lower quality desert tortoise habitat, according to the predictive model. Across the NECO planning area, the cumulative effects to moderate quality desert tortoise habitat from proposed future projects is particularly significant but even seemingly minor effects to higher quality habitat are significant given the species' decline and the present and future direct and indirect threats from habitat fragmentation and its associated impacts on population viability, the effects of increased predation from ravens, and other reasonably foreseeable future threats.

One of the objectives for desert tortoise recovery in the NECO is to "*mitigate effects on desert tortoise populations and habitat outside DWMAs to provide connectivity between DWMAs*." Maintaining connectivity is particularly important given the threats posed by global climate change, according to the USFWS 2008 Draft Revised Recovery Plan. Probable desert tortoise linkages between the Chuckwalla and Chemehuevi Critical Habitat Units and DWMAs are shown in **Biological Resources Figure 6.** The linkages depicted represent areas of the best habitat quality for tortoises between the DWMAs and critical habitat, and therefore represent the most probable linkages and most

important areas to protect to maintain connectivity between the Chemehuevi and Chuckwalla DWMAs. The identified linkages are based on a review of information on existing vegetation and landform data (NECO datasets and Project-specific survey data) and depicted in the USGS habitat model. The location of available lands in “probable” linkages is a useful tool for identifying potential acquisition lands for desert tortoise mitigation, and for evaluating different land-use issues that tortoises face at a landscape scale. **Biological Resources Figure 6** identifies these linkages based on the areas of moderate and high quality habitat between management areas for a qualitative analysis of cumulative effects; however, the impacts to linkages are not quantified here as the areas have not been formalized or created as shape layers suitable for GIS analysis. Along with the linkages depicted in **Biological Resources Figure 6**, additional linkages through areas currently considered lower quality habitat that could be restored may also be important for long-term connectivity between the Chemehuevi and Chuckwalla DWMAs. The Project would not contribute significantly to loss of desert tortoise connectivity between the Chuckwalla and Chemehuevi Desert Wildlife Management Areas (DWMAs) and Critical Habitat Units.

While impacts to higher quality habitat are small (approximately 3 percent) relative to cumulative effects to moderate and low quality habitat, this nevertheless represents over 53,000 acres of habitat and over 150,000 acres of moderate and moderately high quality habitat that would be lost to proposed future projects. Although the Project impacts only lower quality habitats, it nevertheless contributes, at least incrementally, to a cumulatively considerable effect. In situations where the combined impact is most severe, even small incremental impacts may be cumulatively considerable.

The USFWS has expressed significant concerns about the likelihood of renewable energy development resulting in increased raven numbers even with implementation of project-specific raven management plans (USFWS 2010). To mitigate the Genesis Project’s contribution to cumulative and indirect impacts on desert tortoise from raven predation, staff proposes that the applicant contribute toward implementation of the Regional Raven Management Program, and Project-specific mitigation measures as described in Condition of Certification **BIO-13** and **BIO-12**. The applicant’s payment would support the regional raven management plan activities focused within the Colorado Desert Recovery Unit, which would be adversely affected by increases in raven subsidies attributable to the proposed Project. In addition, BIO-13 requires development of Project-specific raven management actions that would reduce foraging and nesting opportunities for ravens in and near the Project area. With the implementation of staff’s proposed Condition of Certification **BIO-12** (acquisition of compensation lands), desert tortoise-specific avoidance and minimization measures **BIO-1** through **BIO-6**, and monitoring and reporting requirements in **BIO-7,** staff believes that the Project’s contribution to cumulative impacts to desert tortoise habitat would be less than considerable. Condition of Certification **BIO-12** specifies that compensation habitat acquisitions occur within the Colorado Desert Recovery Unit in areas that have potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserved lands. Indirect effects to desert tortoise from ravens and the degradation of habitat quality from the spread of noxious weeds would be minimized through the detailed raven and weed management plans required under **BIO-13** and **BIO-14.**

Biological Resources Table 12
Cumulative Effects: Desert Tortoise Habitat*

Habitat Value*	Total Desert Tortoise habitat* in NECO	Impacts to Habitat from Existing** Projects (Percent of total in NECO)	Impacts to Habitat from Foreseeable Future*** Projects (Percent of total in NECO)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects)
0	243,679 acres	67,028 acres 27.5%	21,774 acres 8.9%	0 acres
0.1	233,260 acres	9,094 acres 3.9%	25,937 acres 11.0%	523 acres 2.0%
0.2	373,170 acres	9,288 acres 2.5%	44,595 acres 12.0%	1,277 acres 2.9%
0.3	628,960 acres	11,987 acres 1.9%	38,163 acres 6.1%	52 acres 0.1%
0.4 – 0.5	787,882 acres	15,885 acres 2.0%	61,163 acres 7.8%	0 acres
0.6 – 0.7	1,381,024 acres	10,279 acres 0.7%	94,944 acres 6.9%	0 acres
0.8 – 0.9	1,868,475 acres	9,233 acres 2.8%	53,074 acres 2.8%	0 acres
1.0	30,883 acres	71 acres 0.2%	55 acres 0.2%	0 acres

*Based on the USGS Desert Tortoise Habitat Model (Nussear et al. 2009).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis and those additional future projects listed in **Biological Resources Table 9**.

Implementation of staff's proposed conditions of certification would reduce the Project's contribution to cumulative impacts to desert tortoise habitat, movement, and connectivity would be less than considerable. There may be cumulative impacts after mitigation is implemented by all projects, but due to the mitigation implemented by the Project, its contribution would not be cumulatively considerable. These residual cumulative effects from all future projects could be addressed through a regional and coordinated planning effort aimed at preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors.

Nelson's bighorn sheep

The distribution and extent of the NECO-designated bighorn sheep WHMAs (occupied and unoccupied range) and connectivity corridors, overlaid with past and foreseeable future projects within the NECO Planning Area, are quantified in **Biological Resources Table 13** and illustrated in **Biological Resources Figure 7-a**. The GIS analysis of the NECO bighorn sheep WHMAs and connectivity corridors indicates that occupied and unoccupied ranges and connectivity corridors are unaffected by the proposed Project. However, large-scale renewable energy development in the region north of Highway 62 could significantly impact gene flow between sheep populations through significant cumulative impacts to connectivity corridors, potentially decreasing the viability of the metapopulation of bighorn sheep. The Genesis Project itself, however, has no direct contribution to the loss of habitat within the identified connectivity corridors or the WHMAs.

The Genesis Project is located within the proposed Palen-Ford multi-species WHMA (BLM CDD 2002; map 2-21); but is mainly located outside the sensitive habitats for which the WHMA was primarily established (i.e., dunes and playas). The Project is not located within a bighorn sheep WHMA or corridor (BLM CDD 2002). The cumulative effects of all other proposed future projects on bighorn sheep connectivity can only be addressed through a regional and coordinated effort aimed at preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors.

Biological Resources Table 13
Cumulative Effects: Bighorn Sheep WHMAs and Connectivity Corridors

Bighorn sheep WHMAs & Connectivity Corridors*	**Total WHMA or Connectivity Corridor* in NECO**	**Impacts to WHMAs & Connectivity Corridors from Existing** Projects** (Percent of all WHMAs or Corridors in NECO)	**Impacts to WHMAs & Connectivity Corridors from Foreseeable Future*** Projects** (Percent of all WHMAs or Corridors in NECO)	**Contribution GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Total in NECO	2,552,074 acres	9,872 acres 0.4% of total NECO	93,295 acres 3.7% of total NECO	0 acres
Occupied Range	1,718,254 acres	6,008 acres 0.3% of total Occupied range	51,508 acres 2.3% of total Occupied range	0 acres
Unoccupied Range	232,506 acres	1,409 acres 0.6% of total Unoccupied range	8,134 acres 3.5% of total Unoccupied range	0 acres
Connectivity Corridors	601,313 acres	2,455 acres 0.4% of total Connectivity corridor	33,653 acres 5.6% of total Connectivity corridor	0 acres

* Based on the BLM NECO Bighorn Sheep WHMAs dataset (BLM CDD 2002).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis and those additional future projects listed in **Biological Resources Table 9**.

Another consideration of this analysis was whether the proposed future projects would cumulatively and significantly affect bighorn sheep through the loss of spring forage on the upper bajadas adjacent to occupied range. Based on recommendations from the Society for Conservation of Bighorn Sheep, staff analyzed the impact of existing and future projects within a one-mile buffer from the base of occupied ranges (or potentially restored populations in unoccupied ranges) on plant communities to assess the potential impacts to bighorn foraging habitat. These impacts are depicted in **Biological Resources Figure 7-b** and summarized in **Biological Resources Table 14**, below. No direct or cumulatively considerable effects to bighorn sheep WHMAs or spring foraging habitat would result from the proposed Project and thus no mitigation measures relating to bighorn sheep are proposed by staff. Impacts to spring foraging habitat in other affected portions of NECO, from other projects, remain significant, however. Approximately 4.5 percent of all spring forage in Sonoran creosote bush scrub and an additional 3.3 percent of Mojave creosote bush scrub within a mile of bighorn sheep WHMAs would be affected from all other foreseeable future projects.

Biological Resources Table 14
Cumulative Effects: Bighorn Sheep Spring Foraging Habitat within 1 Mile of Bighorn Sheep WHMAs and Connectivity Corridors

Foraging Habitat* (by plant community)	**Total Plant Communities* within 1-mile buffer of Bighorn Sheep WHMAs**	**Impacts to Spring Foraging Habitat from Existing** Projects** (Percent of all Community types in 1-mile buffer)	**Impacts to Spring Foraging Habitat from Foreseeable Future*** Projects** (Percent of all Community types in 1-mile buffer)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Mojave Creosote Scrub	549,123 acres	936 acres 0.2%	18,342 acres 3.3%	0 acres
Sonoran Creosote Scrub	2,526,869 acres	8.768 acres 0.3%	113,434 acres 4.5%	0 acres
Desert Dry Wash Woodland	277,981	1,371 acres 0.5%	8,167 acres 2.9%	0 acres
Playa/Dry Lake	5,264 acres	0 acres	1,810 acres 34.4%	0 acres
Sand Dunes	6,218 acres	49 acres 0.8%	8 acres 0.1%	0 acres
Chenopod Scrub	258 acres	10 acres 3.9%	0 acres	0 acres
Agriculture, Developed	7,253 acres	N/A	576 acres 7.9%	0 acres
Pinyon-Juniper Woodland	1,928 acres	0 acres	0 acres	0 acres

* Based on the BLM NECO Bighorn Sheep WHMAs dataset (BLM CDD 2002).

** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.

*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis and those additional future projects listed in **Biological Resources Table 9**.

Mojave Fringe-toed Lizard

The geographic scope for the first of two cumulative effects analyses for Mojave fringe-toed lizard is the entire NECO planning area; the second analysis looked only at the habitat for the Chuckwalla Valley population. The NECO habitat dataset for Mojave fringe-toed lizard, which included all but the highest portions of the mountain ranges, was refined to reflect the species restriction to sandier substrates. Using the NECO landforms dataset, staff created a habitat model by selecting the following landforms: crescentic dunes, longitudinal dunes, undifferentiated dunes, sandy dissected fans, sandy plains, and dry playas. Dry playas were included because they often have at least a veneer of sand. The selected landforms were overlaid with documented occurrences of Mojave fringe-toed lizard from CNDDB and the detailed field survey data from four renewable energy projects within the NECO boundary. The occurrence data was in considerable agreement with the selected landforms; no corrections were

necessary and no attempt was made to rank habitat value. **Biological Resources Figure 8** and **Biological Resources Table 15** present the results of the Mojave fringe-toed lizard habitat mapping overlaid with the existing and future projects within the NECO planning area to quantify the cumulative effects of all projects on habitat loss. **Biological Resources Table 15** also summarizes the cumulative loss of habitat for six additional plant and animal species discussed later in this section (American badger and desert kit fox, burrowing owl, Le Conte's thrasher, burro deer, Couch's spadefoot toad, and Harwood's milk-vetch),

However, there are also cumulatively considerable indirect effects to Mojave fringe-toed lizard that are not reflected in this quantitative analysis of habitat loss. These include impacts to sand transport systems and the maintenance of dunes from renewable energy projects (wind fencing and the obstruction of sand-carrying winds and water-deposited sands); premature stabilization of dunes by the spread of noxious weeds, which also fuel wildfires; increased risk of fire from transmission lines and increased ignition rates and vehicle-related mortalities from the introduction of vehicles into formerly undisturbed habitats; the effects of past and future grazing and off-road vehicle use; fragmentation of the remaining habitat and the accompanying isolation and reduced population viability; and an increase in predation by ravens and other predators from an increase in perching structures. Staff considers these indirect cumulative effects significant. Of particular concern with all proposed projects within the aeolian (wind-deposited) sand transport corridor is the indirect downwind loss of dune habitat and habitat quality from obstructions (structures and wind fencing). Studies and examples in nearby Coachella Valley suggest that such effects can be acute and occur quickly (Katra et al. 2009; Turner et al. 1984).

Future (proposed) projects alone will cumulatively cause a direct loss of over 103,000 acres (16 percent) of all Mojave fringe-toed lizard habitat. Although the Project's contribution to these NECO-wide effects is relatively minor it nevertheless contributes, at least incrementally, to a significant cumulative effect.

Within Chuckwalla Valley (**Biological Resources Table 15** and **Biological Resources Figures 9**), nearly 13,000 acres (12.9 percent) of the Mojave fringe-toed lizard habitat would be directly impacted by the construction of all proposed projects. The Project's contribution to the direct loss of habitat for the Chuckwalla Valley population of Mojave fringe-toed lizard is somewhat more substantial in the local context (1.7 percent). However since publication of the Draft SA/EIS, the applicant re-designed the facility footprint by removing a 41.4-acre "toe" area which decreased direct impacts to sand dunes from 28 acres to 1 acre (from construction of the transmission line linear facility). Removal of 27 acres of impact to sand dune habitat also substantially decreased the Project's effects to the regional sand migration corridors that occur in the Genesis Project area (TTEC 2010o).

In addition to the minimization of effects created by the re-desgin, the Project's contribution to cumulative effects would also be reduced by proposed compensatory mitigation identified in Condition of Certification **BIO-20**, which requires implementation of impact avoidance and minimization measures and acquisition of habitat to mitigate for the Project-related loss of sand dune and other sandy habitats that support Mojave fringe-toed lizards. Condition of Certification **BIO-20** specifies that the acquisitions

would need to be targeted for sand dune or partially stabilized sand dune habitat within the Chuckwalla Valley. Impacts to desert washes in Chuckwalla Valley, some of which contribute sand to the aeolian transport corridor, would be offset through Condition of Certification **BIO-22** by acquiring and preserving private lands in the valley containing desert washes that are not currently protected under a conservation easement and could be developed in the future. Indirect effects from ravens and the spread of Sahara mustard and other noxious weeds would be minimized through **BIO-13** and **BIO-14.** Implementation of all mitigation measures would be assured through Condition of Certification **BIO-7**. Therefore, with the implementation of the aforementioned conditions of certifications, the Project's contribution to the cumulative effects to Mojave fringe-toed lizard would be less than considerable.

Biological Resources Table 15
Cumulative Effects: Special-status Species Habitat

Special-status Species Habitat	**Total habitat in NECO** (or other study area)	**Impacts to Habitat from Existing+ Projects** (percent of total habitat)	**Impacts to Habitat from Foreseeable Future++ Projects** (percent of total habitat)	**Contribution GSEP to future cumulative impacts**[1] (percent of total future impacts)
Mojave fringe-toed lizard habitat* (all NECO)	630,121 acres	14,541 acres 2.3%	103,604 acres 16.4%	224 acres 0.2%
Mojave fringe-toed lizard habitat* (Chuckwalla Population)	99,657 acres	8,290 acres 8.3%	12,845 acres 12.9%	224 acres 1.7%
American badger and desert kit fox habitat*	4,795,631 acres	134,750 acres 2.8%	339,704 acres 7.1%	1,811 acres 0.5%
Burrowing owl habitat***	4,795,631 acres	134,750 acres 2.8%	339,704 acres 7.1%	1,811 acres 0.5%
LeConte's thrasher habitat****	3,718,357 acres	47,078 acres 1.3%	300,139 acres 8.1%	1,811 acres 0.6%
Burro deer range*****	637,453 acres	10,236 acres 1.6%	47,640 acres 7.5%	151 acres 0.3%
Couch's spadefoot toad range******	1,548,597 acres	88,992 acres 5.7%	115,218 acres 7.4%	1,811 acres 1.6%
Harwood's milk-vetch habitat*******	3,134,303 acres	54,788 acres 1.8%	274,727 acres 8.8%	1,811 acres 0.7%

1 = Acreages adjusted to reflect removal of the 41.4 acre "toe" (TTEC 2010o).
*Total habitat based on the BLM NECO Landforms dataset (BLM CDD 2002), selecting following values: undifferentiated dunes; crescentic dunes, longitudinal dunes; sandy plains; playas, and sandy dissected fans.
**Total habitat based on the BLM NECO Landforms dataset (BLM CDD 2002), excluding mountains playas, badlands, and lava flows
***Total habitat based on the BLM NECO Landforms dataset (BLM CDD 2002), excluding dunes, playas, mountains, badlands, and lava flows
****Total habitat based on the NECO habitat model for LeConte's thrasher
*****Total habitat based on the NECO habitat model for burro deer (mule deer)
******Total habitat based on the NECO range map for Couch's spadefoot toad
*******Total habitat based on Staff's habitat model for Harwood milk-vetch. Using the NECO landforms model and selecting landforms on which occurrences of Harwood's milk-vetch have been documented; landforms do not imply presence of Harwood's milk-vetch
+ Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
++ Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9

Golden Eagle

Staff conducted four different analyses of cumulative effects on golden eagle foraging habitat: 1) the entire NECO planning area (**Biological Resources Figures 10**); 2) foraging habitat within 10 miles of the base of all mountain landforms within NECO (**Biological Resources Figures 11-a**); 3) a 10-mile radius around the Project (**Biological Resources Figures 11-b**), and 4) a 140-mile radius around the Project (**Biological Resources Figures 11-c**).

The model of foraging habitat adjacent to mountain landforms was based on an assumption that the mountainous areas were the most likely sites for golden eagle nests. The 140-mile analysis (**Biological Figure 11-c**) used the California GAP vegetation mapping dataset (Davis et al. 1998), a project of the Biogeography lab at UC Santa Barbara. The vegetation mapping depicted in Arizona and Nevada is based on the National GAP vegetation mapping project. The original GAP mapping of desert dry wash woodlands and dunes was improved for the NECO plant communities dataset used in **Biological Figures 11-a and 11-b** (BLM CDD 2002; Appendix H); however, all datasets are based largely on aerial photo interpretation and would not be considered as accurate as a ground-based and field-verified delineation of habitats. The basis for a 140-mile analysis (which was limited by a lack of compatible vegetation mapping data for Mexico) was based on an analysis of band recovery data provided by the U.S. Bird Banding Laboratory which showed that 90 percent of mature golden eagles re-encountered during the breeding season were within 140 miles of their natal site (USFWS 2009). Currently, no nests have been documented within 10 miles of the Project. Golden eagle nest surveys were completed in spring 2010 but the results were not available at the time of publication of the RSA. **Biological Resources Table 16** summarizes the impacts to foraging habitat for **Biological Resources Figures 11-a** through **11-c**. Please see **Biological Resources Table 18** and **Figure 19-a** for a summary and map of impacts to plant communities within entire NECO planning area.

All of the golden eagle foraging habitat figures depict the locations of currently known and documented golden eagle nest locations. The source of this information include the "nest card" database, desert-wide helicopter surveys conducted in 1978 and 1979, and locations depicted in a 1984 BLM California Desert Conservation Area (CDCA) map of “Sensitive, Rare, Threatened and Endangered Fish and Wildlife” that were digitized for this analysis (BLM 1999). It is unknown whether these nests are still active and/or present; this analysis assumes that they could be active and, at a minimum, that the site is suitable for nesting. The nest locations depicted are approximate (with a margin of error +/- 1-2 miles) and the map should not be viewed as a substitute for site-specific nest surveys to assess project impacts.

The loss of foraging habitat quantified in the GIS analysis is but one picture of the range-wide cumulative effects that have contributed to a sharp decline in golden eagle populations in recent years. The USFWS and others (USFWS 2009b; Kochert et al. 2002) estimate there are approximately 30,000 golden eagles in the western U.S., down from an estimated 100,000 in the late 1970s. Survey data from 2003 and 2006-2008 indicate a decline of 26 percent since 2003. Climate change is also expected to impact golden eagle by increasing drought severity, and the CO_2 concentrations are expected to exacerbate the spread of invasive weeds, which displace native species and habitats,

fuel wild fires, and alter fire regimes. Wind energy development may also be particularly harmful to golden eagles; however, the proposed transmission lines for this and other proposed future projects are also expected to increase raptor collisions and electrocutions. Lead poisoning and the loss of prey species are also important contributors to golden eagle mortality and the overall decline in habitat function and value from human activities.

Proposed future projects within 10 miles of all mountains (**Biological Resources Figure 11-a** and **Biological Resources Table 16**) would cumulatively affect over 325,000 acres of foraging habitat (not including agriculture). The combined effect of all existing and probable future impacts to the loss of foraging habitat within 10 miles of the Project is also significant. Proposed future projects within 10 miles of the Project site (**Biological Resources Figures 11-b**) would cumulatively affect over 31,780 acres of foraging habitat (not including agriculture)—nearly 10 percent of all potential foraging habitat. The Project contributes, at least incrementally, to a significant cumulative loss of foraging habitat, and habitat quality for a species in sharp decline. In situations where the cumulative impact is most severe, even small incremental impacts may be cumulatively considerable.

The Project's contribution to the cumulative loss of foraging habitat would be less than cumulatively considerable with the implementation of staff's proposed conditions of certification to address both habitat loss and the indirect effects described above. As specified in staff's proposed Condition of Certification **BIO-12**, the Applicant shall acquire and protect 1,864 acres of Sonoran creosote bush scrub within the Colorado Desert Recovery Unit (for desert tortoise), 190 acres of Mojave fringe-toed lizard habitat (**BIO-20**), and 132 acres of ephemeral desert washes within or adjacent to the Chuckwalla- Ford Dry Lake watershed (**BIO-22**). While acquisition does not address the net loss of foraging habitat in the immediate future, it is expected to prevent future losses of habitat by placing a permanent conservation easement and deed restrictions on private lands that could otherwise be converted for urban or agricultural uses, or energy development. The Project's contribution to the indirect cumulative effects to foraging habitat from the spread of invasive non-native plants would be less than considerable after implementation of Condition of Certification **BIO-14** (Weed Management Plan.

There may be cumulative impacts after mitigation is implemented by this Project, but the mitigation implemented by the proposed Project reduces its contribution to cumulative impacts to a level that is is not cumulatively considerable. These residual cumulative effects from all future projects—after mitigation to less than significant—could be addressed through a regional and coordinated planning effort aimed at preserving and enhancing large, intact expanses of foraging habitat, limiting development near nest sites, developing guidelines for minimizing collisions and electrocutions, and other programmatic efforts.

Biological Resources Table 16
Cumulative Effects: Golden Eagle Foraging Habitat

Cumulative Effects: Golden Eagle Foraging Habitat Within 10 miles of Mountains				
Foraging Habitat* (by plant community)	**Total Plant Communities* within 10-mile buffer of mountains in NECO**	**Impacts to Foraging Habitat from Existing** Projects** (Percent of all Community types in 10-mile buffer)	**Impacts to Foraging Habitat from Foreseeable Future*** Projects** (Percent of all Community types in 10-mile buffer)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Mojave Creosote Scrub	728,536 acres	1,691 acres 0.2%	33,920 acres 4.7%	0 acres
Sonoran Creosote Scrub	3,571,797acres	22,019 acres 0.6%	228,363 acres 6.4%	1,773 acres 0.8%
Desert Dry Wash Woodland	654,735	8,128 acres 1.2%	48,086 acres 7.3%	16 acres**** 0.03%
Playa/Dry Lake	54,433 acres	961 acres 1.8%	15,713 acres 29%	37 acres 0.2%
Sand Dunes	60,807 acres	1,465 acres 2.4%	175 acres 0.3%	1 acre 0.6%
Chenopod Scrub	982 acres	72 acres 7.3%	0 acres	0 acres
Agriculture, Developed	79,894 acres	N/A	1,011 acres 1.3%	0 acres
Pinyon-Juniper Woodland	1,928 acres	0 acres	0 acres	0 acres

Cumulative Effects: Golden Eagle Foraging Habitat Within 10 miles of Project				
Foraging Habitat* (by plant community)	**Total Plant Communities* within 10-mile buffer of Project**	**Impacts to Foraging Habitat from Existing** Projects** (Percent of all Community types in 10-mile buffer)	**Impacts to Foraging Habitat from Foreseeable Future*** Projects** (Percent of all Community types in 10-mile buffer)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Mojave Creosote Scrub	0 acres	0 acres	0 acres	0 acres
Sonoran Creosote Scrub	257,135 acres	1,559 acres 0.6%	23,935 acres 9.3%	1,773 acres**** 7.4%
Desert Dry Wash Woodland	62,575 acres	1,255 acres 2.0%	7,677 acres 12.3%	16 acres**** 0.2%
Playa/Dry Lake	5,269 acres	950 acres 18.0%	0 acres	37 acres**** 100%
Sand Dunes	5,613 acres	0 acres	168 acres 3.0%	1 acre**** 0.6%
Chenopod Scrub	216 acres	62 acres 28.7%	0 acres	0 acres
Agriculture, Developed	2,205 acres	N/A	140 acres 6.3%	0 acres

Pinyon-Juniper Woodland	0 acres	0 acres	0 acres	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996), updated during the NECO planning effort (see Appendix H of the NECO Management Plan (BLM CDD 2002)
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
**** Numbers reflect actual ground-based and field verified delineation of habitats (TTEC 2010-l; GSEP 2009a). Dune acreage (1ac.) reflects adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

Cumulative Effects: Golden Eagle Foraging Habitat+ 140-mile Radius Area
+ Different vegetation mapping dataset than NECO area analyses; used California GAP Analysis dataset and National GAP program data for Arizona

Foraging Habitat+ (by plant community)	**Total Plant Communities+ in 140-mile Radius of Project**	**Impacts to Foraging Habitat from Existing ++Projects** (Percent of all community type in 140-mile radius)	**Impacts to Foraging Habitat from Foreseeable Future+++ Projects** (Percent of all community type in 140-mile radius)	**Contribution of BSPP to future cumulative impacts** (Percent of total impacts from future projects) [1]
Mojavean & Sonoran Desert Scrubs	19,813,486 acres	n/a	1,106,998 acres 5.6%	1,773 acres++++ 0.2%
Great Basin Desert Scrubs	263,209 acres	n/a	7,419 acres 2.8%	0 acres
Alkali Desert Sink Scrub	374,785 acres	n/a	33,728 acres 9.0%	0 acres+++++
Desert Succulent Scrubs++++ (desert scrubs with cacti/succulents)	3,497,649 acres	n/a	68,671 acres 2.0%	0 acres
Chaparral	2,497,868 acres	n/a	21,940 acres 0.9%	0 acres
Riversidean Sage Scrub	368,827 acres	n/a	0 acres	0 acres
Desert Riparian (woodlands)	234,632 acres	n/a	0 acres	16 acres++++ 100%
Desert Wash (unvegetated and wash scrubs)	858,560 acres	n/a	57,723 acres 6.7%	74 acres++++ 0.1%
Playa/Lacustrine	282,667acres	n/a	0 acres	37 acres 100%
Agriculture	1,604,793 acres	n/a	1,387 acres 0.1%	0 acres
Pinyon-Juniper Woodland	859,050 acres	n/a	164 acres 0.02%	0 acres
Montane Conifer	719,915 acres	n/a	9,663 acres 1.3%	0 acres
Montane Riparian Woodland	8,106 acres	n/a	0 acres	0 acres
Oak Woodland	114,388 acres	n/a	148 acres 0.1%	0 acres
Urban	1,307,902 acres	n/a	48 acres 0.004%	0 acres
Riverine and	105,806 acres	n/a	561 acres	0 acres

Lacustrine (open water)			0.5%	
Grassland and Mixed Shrub-Grass	584,229 acres	n/a	1,368 acres 0.2%	0 acres
Wet Meadow	26,568 acres	n/a	0 acres	0 acres
Emergent Marsh (Saline and Freshwater)	9,579 acres	n/a	9.8 acres 0.1%	0 acres
Palm Oasis	3,029 acres	n/a	0 acres	0 acres
Barren (Rock outcrop)	219,155 acres	n/a	337 acres 0.1%	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996), updated during the NECO planning effort (see Appendix H of the NECO Management Plan (BLM CDD 2002)
** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 9** (February 2010)
**** Includes the indirect effects to dune habitat (33 ac.) from the proposed SCE Colorado Substation, and 4 acres direct impacts from the linear facilities of the Project. Substation impacts will be mitigated under the authority of the CPUC.
+Based on the California GAP Analysis conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996). Arizona vegetation data based on National GAP Program data. Nevada GAP data not included in Table 15
++Existing impacts dataset not compiled for this analysis
+++Based only on future (proposed) renewable energy projects in California and Arizona; ROW obtained from BLM California and BLM Arizona; includes only projects with a Plan of Development (POD) at the time of the analysis (May 2010). BLM Nevada GIS-based data not available at time of analysis (May 2010)
++++Includes Joshua Tree Woodland, Mojave Yucca Woodland, and various mixed shrub and cacti communities
+++++Numbers reflect the ground-based delineation of habitats and state waters; dune acreage (1ac.) reflects adjustment for removal of the 41.4 acre “toe” (TTEC 2010o).

American Badger and Desert Kit Fox

The geographic scope for the cumulative analysis for these two species encompasses the entire NECO planning area. Using the NECO landforms dataset, the extent of suitable habitat depicted in the NECO plan was refined somewhat by excluding the following landforms: playas, badlands (steep erosional features), lava flows, and mountains. The remaining habitat was then overlaid by existing and foreseeable future projects to quantify cumulative impacts to badger and kit fox habitat (**Biological Resources Table 15** and **Biological Resources Figure 12**).

This quantitative analysis of habitat loss does not address use of the Project site and adjacent habitat for both foraging and movement pathways. Other reasonably anticipated cumulative effects not quantified here include habitat fragmentation and the diminished habitat values of remaining habitat from increased noise; disruption from night lighting; exotic plant invasion (which fuels wildfires and alters fire regimes); dust and air pollution; an increase in predators; agriculture and urban development, and; the consequences of human intrusion into previously undisturbed habitats (such as hunting, use of rodenticides and other poisons, road kills, trapping, and human disturbance).

An estimated 339,704 acres of American badger and desert kit fox habitat would be displaced by the proposed future projects within the NECO planning area, representing approximately 7 percent of the total habitat mapped in NECO (based on the simple habitat model described above). Staff considers this a cumulatively considerable contribution to a significant cumulative effect, particularly when viewed in combination

with the anticipated indirect effects of habitat fragmentation and degradation to remaining habitat and other threats described above. The Project contributes—at least incrementally—to a significant cumulative effect. Staff's proposed Condition of Certification **BIO-12** requiring acquisition of 1,864 acres of Sonoran creosote bush scrub within the Colorado Desert Recovery Unit (for desert tortoise), 190 acres of Mojave fringe-toed lizard habitat **(BIO-20)** within Chuckwalla Valley, and 132 acres of desert washes **(BIO-22)** within the immediate or adjacent watershed, would also benefit American badger and desert kit fox. With the implementation of habitat acquisition (**BIO-12, 20, and 22**), and the avoidance and minimization measures for American badger and desert kit fox contained in **BIO-17**, the Project's contribution to the combined effects of the Project and the past, present, and probable future impacts would be less than cumulatively considerable. While acquisition does not replace the habitat, it prevents future losses of habitat through conservation easements and deed restrictions on private lands that could otherwise be converted for urban or agricultural uses, or energy development. A programmatic and multi-agency approach to address the cumulative effects of all projects, after implementation of the Project-specific mitigation measures, is currently in progress.

Western Burrowing Owl

Using the NECO landforms dataset, the extent of suitable habitat for burrowing owl in the NECO planning area was refined by excluding the following landforms: dunes, mountains, playas, badlands (steep erosional features) and lava flows. The results were then overlaid by existing and foreseeable future projects to quantify cumulative impacts to burrowing owl habitat **(Biological Resources Table 15** and **Biological Resources Figure 13)**.

The GIS-based analysis of habitat loss does not reflect the significant cumulative effects of habitat fragmentation and its impacts on population viability, increased road kills, increased risk of fire from weed invasion and ignition sources, and the degradation of remaining habitat function and values. Staff considers the combined effect of all proposed future projects on habitat loss (339,704 acres or 7.1 percent loss of all habitat in the NECO planning area), and the indirect effects described above, to be a significant cumulative effect to which the Project contributes incrementally. However, the Project's contribution to cumulative effects would be reduced to a level less than considerable through implementation of the following conditions of certification: acquisition of 1,864 acres of Sonoran creosote bush scrub within the Colorado Desert Recovery Unit for desert tortoise (**BIO-12)**, 190 acres of Mojave fringe-toed lizard habitat **(BIO-20)** within Chuckwalla Valley, and 132 acres of desert washes **(BIO-22)** within the immediate or adjacent watershed. This proposed habitat replacement would also be expected to benefit burrowing owl by preventing future losses of habitat that is currently zoned for energy or other development. The Raven Management Plan **(BIO-13)** and Weed Management Plan **(BIO-14)** are also expected to minimize the Project's contribution to the indirect effects of increased avian predators and the spread of invasive plants, and **BIO-18** contains measures specifically for avoiding and minimizing impacts to burrowing owl.

Le Conte's Thrasher

The scope of this analysis includes the entire NECO planning area and utilized the NECO Le Conte's thrasher habitat dataset to quantify cumulative effects of habitat loss from existing and foreseeable future projects (**Biological Resources Table 15** and **Biological Resources Figure 14)**. The NECO habitat model for this species is applicable to several other special-status bird species that inhabit desert dry wash woodland and adjacent upland habitat, including loggerhead shrike, phainopepla, ash-throated flycatcher, and northern mockingbird. The cumulative impacts to migratory birds not addressed in the quantitative analysis of habitat loss include habitat fragmentation, and degradation, and impacts to riparian and groundwater-dependent vegetation and riparian vegetation from water overdrafts and diversions.

The combined effect of the Project and the existing and probable future impacts are substantial; 300,139 acres of desert scrubs and desert wash woodland would be lost to future renewable energy development within the NECO planning area alone; this represents 8.1 percent of all potential habitat in NECO. Staff believes that the Project's contribution to the cumulative loss of habitat would be less than cumulatively considerable through implementation of proposed Condition of Certification **BIO-22**, which requires acquisition and enhancement of desert dry wash woodland and unvegetated ephemeral washes within the same watershed as the Genesis Project. Condition of Certification **BIO-12** requires compensatory habitat acquisition for desert tortoise habitat, which is also expected to benefit Le Conte's thrasher, and **BIO-15** requires pre-construction nesting bird surveys. Proposed Conditions of Certification **BIO-25** and **BIO-26** would require monitoring for impacts to groundwater-dependent vegetation within 10 miles of the Project pumping well and require remedial action if adverse effects are detected. The Project's contributions to the cumulative effects to Le Conte's thrasher from the indirect effects described above would be less than cumulatively considerable with the implementation of these additional mitigation measures.

Burro Deer

Burro deer is a subspecies of mule deer found in the Colorado Desert of Southern California, primarily along the Colorado River and in desert dry wash woodland communities away from the river. During the hot summers, water is critical, and deer concentrate along the Colorado River where water developments have been installed and where the microphyll woodland is dense and provides good forage and cover. Impacts are most important within 1/4 mile of natural or artificial watering sites; these sites are depicted in the bighorn sheep Wildlife Habitat Management Area map, **Biological Resources Figure 7a,** and are based on the NECO dataset for natural and artificial water sources.

Biological Resources Table 15 summarizes the anticipated cumulative effects to burro deer range; these effects are also illustrated in **Biological Resources Figure 15.** Using the NECO dataset for burro deer range, approximately 151 acres of the total 47,640 acres (0.3 percent) of burro deer range in the NECPO plan area would be displaced by the Genesis Project. Proposed future projects would cumulatively affect 7.5 percent of the burro deer range, as the range is documented in NECO (BLM CDD 2002). Staff's proposed Condition of Certification **BIO-22** for acquisition of 132 acres of desert washes

within or adjacent to the Chuckwalla-Ford Dry Lake watershed, and Condition of Certification **BIO-12** for acquisition of 1,864 acres of Sonoran creosote bush scrub would reduce the Project's contributions to the cumulative loss of burro deer range to a level less than cumulatively considerable. The Project's contribution to indirect cumulative effects would be minimized through **BIO-14** (detailed Weed Management Plan), **BIO-24** (revegetation of temporarily disturbed areas), and **BIO-25** and **26** (monitoring for impacts to groundwater-dependent vegetation within 10 miles of the Project pumping well and remedial action if adverse effects are detected).

Burro deer movement between the eastern portion of Ford Dry Lake and the Palen Wash ironwood forest, which is depicted in **Biological Resources Figure 15** as burro deer range, would be impacted by the proposed Project. This is not expected to be a significant impact because the importance of this linkage is already compromised by OHV and other human disturbance from the Wiley Well Rest Stop, and because the western portion of the ROW will be returned to BLM, thus allowing continued movement upslope into the Palen Wash and Palen Mountain Range from the west.

The cumulative effects of all future projects on wildlife movement and connectivity are discussed below and addressed in part through a proposed coordinated, multi-agency approach to preserving important linkages in the Chuckwalla Valley outlined in **Biological Resources Appendix B.**

Couch's Spadefoot Toad

The NECO Couch's spadefoot toad range dataset was used in this analysis to quantify cumulative impacts to potential habitat (**Biological Resources Table 15** and **Biological Resources Figure 16**). Based on the dataset's depiction of the range the GIS analysis indicates that the cumulative effects of all proposed future projects would affect 115,218 acres of Couch's spadefoot toad range in California, or 7.4 percent of its total range in California. Staff considers this a significant cumulative effect to which the Project would contribute to at least incrementally. The Project's contribution to this significant cumulative effect would be minimized to a level less than cumulatively considerable through implementation of staff's proposed Condition of Certification **BIO-27**, which specifies avoidance and minimizations measures for the known breeding pond south of I-10 along the interconnecting transmission line. The Project's contribution to an increase in invasive non-native plants and avian predators would be minimized through staff's proposed conditions of certification **BIO-13** (Raven Management Plan) and **BIO-14** (Weed Management Plan).

Wildlife Movement and Connectivity

Connectivity refers to the degree to which organisms can move among habitat patches and populations. Individuals must be able to move between patches to meet their resource needs, and in the long term populations must be connected to allow for dispersion, gene flow, and re-colonization. This discussion includes a qualitative discussion of cumulative effects to wildlife movement and connectivity. The probable desert tortoise linkages between the Chuckwalla DWMA and Chemehuevi DWMA are depicted spatially in **Biological Resources Figure 6** "Desert Tortoise DWMAs & Connectivity Corridors", displayed on a base map of USGS desert tortoise habitat modeling (Nussear et al. 2009).

Biological Resources Table 13 and **Figures 7-a** and **7-b** summarize cumulative effects to bighorn sheep WHMAs and connectivity corridors as depicted in the NECO Plan (BLM CDD 2002). **Biological Resources Table 17** and **Biological Resources Figure 17** and **18** look at the cumulative effects to plant communities and landforms within three Multi-Species WHMAs in the Project vicinity: Big Maria Mountains WHMA, Palen-Ford WHMA, and the DWMA Continuity WHMA, which provides connectivity between the Chuckwalla DWMA/ACEC south of I-10 and the Palen-Ford WHMA north of I-10. This analysis utilized the NECO Plant Communities and Landforms datasets to describe the type of habitat affected within each separate WHMA.

Two other solar projects are currently proposed within the Palen-Ford WHMA: Palen Solar Power Project and Chuckwalla Solar One. **Biological Resources Table 17** and **Figures 17** and **18** indicates the Genesis Project is an important contributor to the loss of Sonoran creosote bush scrub (29 percent) and playa (37 acres, including sand drifts at the playa margins) within the Palen-Ford WHMA. The actual ground-delineated and field-verified impact for desert dry wash woodland is 16 acres (see also **Biological Resources Table 5**); the NECO GIS datasets are based on aerial photo interpretation and as such are considered less reliable than verified ground survey results.

The Palen-Ford WHMA, and all other WHMAs within the NECO planning area, was specifically designated to form the NECO Multi-species Conservation Zone, along with the wilderness areas, DWMAs, ACECs, Joshua Tree National Park, and the military bases, to protect the species considered in NECO. The Palen-Ford WHMA was specifically established to protect the dunes and playas (NECO sensitive habitat types) and the Mojave fringe-toed lizard. The Project is responsible for 100% of the future impacts to playa and sand drifts over playa in the Palen-Ford WHMA.

The Genesis solar fields are located largely out of the dune system (after removal of the 41.4 acre “toe” (TTEC 2010o), and the linears moved slightly to avoid dune habitat occupied by Mojave fringe-toed lizard. The Project will not substantially impair the connectivity for those species for which the Palen-Ford WHMA was designated. The contribution of the Project to dune habitat loss does not reflect the indirect downwind effect of the solar field’s obstruction of the wind sand transport corridor. However, re-routing washes from the Palen Mountains around the Genesis site would not represent a significant disruption to wildlife movement as the washes lead only to Ford Dry Lake and I-10; an area that is also disturbed by human and unauthorized vehicle use around the Wiley Well Rest Area.

The combined effect of the Project and all existing and probable future projects in NECO on connectivity within Chuckwalla Valley and the Palen-Ford WHMA is significant and thus the Project will contribute, at least incrementally, to a cumulatively considerable effect. The requirement in **BIO-20** and **BIO-22** to acquire habitat within Chuckwalla Valley and within within the identified connectivity linkages would reduce the Project’s contribution to cumulative effects to connectivity in Chuckwalla Valley and the Palen-Ford WHMA to a level less than cumulatively considerable.

Staff believes that the Project’s contribution to desert tortoise connectivity is not cumulatively considerable; staff has identified the area west of Desert Center and HWY

177 as being the most valuable area for tortoise connectivity based on existing habitat conditions, tortoise densities, and the USGS habitat modeling for the Project vicinity (see **Biological Resources Figure 6**). Additionally, the dunes and playas form a north-to-south barrier to tortoise movement. The Project is also located outside the DWMA Connectivity WHMA. Although the WHMA was not established to specifically serve desert tortoise, the Project does contribute to the loss of habitat (Sonoran creosote bush scrub) within the WHMA. Proposed Condition of Certification **BIO-12** would require acquisition and protection of 1,864 acres of Sonoran creosote bush scrub within the Chuckwalla Desert Tortoise Critical Habitat Unit. Mitigation for cumulative effects to connectivity could be enhanced if desert tortoise acquisitions were targeted for areas that would enhance wildlife connectivity within the same WHMA and corridor, as described in **Biological Resources Appendix B**. Kit foxes, coyotes, and badgers are not NECO species and were not the reason for the establishment of the WHMAs; however, the acquisition of lands within the connectivity linkages described in **Appendix B** would also benefit kit fox, coyote, badger, and burro deer.

Biological Resources Table 17
Cumulative Effects: Wildlife Habitat Management Areas and Plant Communities

Palen-Ford WHMA				
Plant Community* within WHMA	**Total Plant Communities* in WHMA**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in WHMA)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in WHMA)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts to WHMA from Future projects)[1]
Sonoran Creosote Scrub	39,366 acres	2,087 acres 5.3%	5,488 acres 14%	1,587 acres 29%
Desert Dry Wash Woodland****	13,104 acres	932 acres 7.1%	202 acres 1.5%	123 acres****** 61% (16 acres/7.9%)
Sand Dunes	17,690 acres	0 acres	44 acres 0.25%	17 acres****** 39% (1 acres/63.6%)
Chenopod Scrub	381 acres	62 acres 16.3%	0 acres	0 acres****** (38 acres/100%)
Playas	13,696 acres	950 acres 6.9%	0 acres	0 acres****** (37 acres)
Agriculture, Urban	152 acres	146 acres N/A	0 acres	0 acres

Big Maria Mountains WHMA				
Plant Community* within WHMA	**Total Plant Communities* in WHMA**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in WHMA)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in WHMA)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts to WHMA from Future projects)
Sonoran Creosote Scrub	24,436 acres	317 acres 1.3%	3,105 acres 12.7%	0 acres
Desert Dry Wash Woodland****	9,308 acres	507 acres 5.4%	1,008 acres 10.8%	0 acres
Agriculture, Urban	50 acres	n/a	0 acres	0 acres

DWMA Continuity WHMA				
Plant Community* within WHMA	**Total Plant Communities* in WHMA**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in WHMA)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in WHMA)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts to WHMA from Future projects)
Sonoran Creosote Scrub	12,804 acres	856 acres 6.7%	988 acres 7.7%	0 acres
Desert Dry Wash Woodland	275 acres	2.9 acres 1.1%	1.4 acres 0.5%	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002), updated from the California Gap Analysis Project, conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
**** Acreages shown reflect the ground-based and field-verified delineation of habitats (TTEC 2010-l); dune acreage (1 ac) adjusted to reflect removal of the 41.4 acre “toe” (TTEC 2010o).

Natural Communities

Two cumulative effects analyses of different geographic scope were conducted for natural communities: 1) the entire NECO planning area (**Biological Resources Figure 19-a),** and 2) Chuckwalla Valley (**Biological Resources Figure 19-b)**. The NECO plant communities dataset was used for both analyses; it is based on the California Gap Analysis Project (Davis et al. 1998) but the accuracy and resolution of the GAP mapping was improved for the NECO plant communities dataset (BLM CDD; Appendix H) using aerial photos and helicopter surveys. However, such analyses are inferior (in accuracy) to ground-based and field-verified delineation of habitats; consequently, the Project's contribution to cumulative effects reflects the actual ground-based results. **Biological Resources Table 18** quantifies the cumulative effects to plant communities stratified by community type. "Mojave creosote scrub" refers to the creosote bush-dominant desert scrubs that occur within the Mojave Desert region of the California Desert geographic subdivision (Hickman 1993). The transition to Sonoran Desert is mapped at the Bristol Mountains near the Twenty-Nine Palms Marine Corps Base and extends east and south through the NECO planning area, and encompasses the Project area.

Significant cumulative effects to plant communities from probable future projects (before mitigation) across the NECO planning area are seen in many community types: 228,363 acres of Sonoran creosote scrub (5.9 percent of the total habitat type in NECO), 43,320 acres of Mojave creosote bush scrub (5.4 percent), 48,167 acres of desert dry wash woodland (7.1 percent), and 18,634 acres of playa (21.1 percent). Project-specific compensatory mitigation measures—similar to those recommended in this Revised Staff assessment—are likely to be imposed for the future renewable energy projects; however, the combined impacts to habitat reflected in **Biological Resources Table 18** do not address the significant cumulative indirect effects to remaining habitat that can be expected from the past, present, and future projects: fragmentation and edge effects; alteration of the surface drainage patterns and fluvial and aeolian sand transport systems that maintain dune and dry playa habitats (which in turn support many special-status plant species); groundwater pumping impacts to mesquite groves and other phreatophytes; an increase in the risk of fire, and the introduction and spread of noxious weeds. The potential for spread of Sahara mustard is major concern because it is already infesting many areas on and adjacent to the Project and it has the potential to spread explosively if not carefully managed. Sahara mustard has been reported to be toxic to desert tortoise and other herbivores, and is an immediate threat to several special-status plant occurrences. Climate change is expected to exacerbate the effects of drought and noxious weed spread.

The combined effect of the Project and existing and future probable impacts in NECO and Chuckwalla Valley is cumulatively considerable. The Project contributes substantially to the combined effect from all probable future projects in Chuckwalla Valley to Sonoran creosote bush scrub (10.2%), and 100% of the cumulative impacts to playa and sand drifts over playa (a NECO-sensitive natural community). Sonoran creosote bush scrub is a common and widespread community in the southeastern deserts of California; however, this broad designation does not reflect the uncommon and even rare plant assemblages within the alliance of creosote bush that have been documented by the CDFG Vegetation Committee (CDFG 2003); nor does it reflect the reasonably anticipated indirect effects described above. The Project's contribution to

these impacts would be minimized to a level less than cumulatively considerable with implementation of the following conditions of certification: **BIO-12** for acquisition of 1,864 acres of Sonoran creosote bush scrub; **BIO-21** for acquisition and protection of 132 acres of desert washes and desert dry wash woodland within or adjacent to the Chuckwalla-Ford Dry Lake watershed; **BIO-20** for the acquisition and protection of 190 acres of dunes or other sandy landforms within Chuckwalla Valley; **BIO-14** for weed management; **BIO-24** for revegetation of temporarily disturbed areas using locally native seed; and **BIO-25** and **BIO-26** for monitoring of groundwater-dependent vegetation and remedial action in the event of adverse effects.

Biological Resources Table 18
Cumulative Effects: Natural Communities

Natural Communities – NECO				
Plant Community*	**Total Plant Communities* in NECO**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in NECO)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in NECO**)**	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Mojave Creosote Scrub	805,832 acres	6,233 acres 0.8%	43,320 acres 5.4%	0 acres
Sonoran Creosote Scrub	3,829,999 acres	22,815 acres 0.6%	228,363 acres 5.9%	1,773 acres**** 0.8%
Desert Dry Wash Woodland/Microphyll Woodland****	682,027 acres	8,457 acres 1.2%	48,167 acres 7.1%	16 acres**** 0.03%
Playa/Dry Lake**** (including sand drifts over playa margins)	88,110 acres	961 acres 1.1%	18,634 acres 21.1%	37 acres**** 0.2%
Sand Dunes****	62,140 acres	14 acres 0.02%	175 acres 0.3%	1 acre**** 0.6%
Chenopod Scrub	2,113 acres	480 acres 22.7%	0 acres	0 acres
Agriculture, Developed	94,187 acres	N/A	1,017 acres 1.1%	0 acres
Pinyon-Juniper Woodland	1,928 acres	0 acres	0 acres	0 acres
Natural Communities – Chuckwalla Valley				
Plant Community*	**Total Plant Communities* in NECO**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in NECO)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in NECO**)**	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Sonoran Creosote Scrub	403,760 acres	6,657 acres 1.6%	17,306 acres 4.3%	1,773acres**** 10.2%
Desert Dry Wash Woodland/Microphyll Woodland****	148,856	4,645 acres 3.1%	10,950 acres 7.4%	16 acres**** 0.03%
Playa/Dry Lake****	13,696 acres	950 acres 6.9%	0 acres	37 acres**** 100%
Sand Dunes****	18,705 acres	0 acres	168 acres 0.9%	1 acre**** 0.6%
Chenopod Scrub	474 acres	72 acres 15.2%	0 acres	0 acres
Agriculture, Developed	9,345 acres	N/A	568 acres 6.1%	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996), updated during the NECO planning effort (see Appendix H of the NECO (BLM and CDD 2002)

** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9

*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
****Acreages reflect the ground-based and field-verified delineation of habitats, including the 1acre adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

Landforms

Biological Resources Table 19 reflects the cumulative impacts to landforms within the NECO planning area, stratified by landform and based on the NECO landforms dataset. Like the NECO plant communities mapping dataset, the landforms dataset was also based on aerial photo interpretation with some ground-truthing, but is less accurate than ground-based and field-verified delineations of habitat. However, the landforms dataset was in considerable alignment with the ground-based and verified habitat mapping.

As illustrated below, and illustrated spatially in **Biological Resources Figure 20,** the cumulative effects of all future (proposed) projects to dunes, playas, and plains are significant. Dunes and sandy plains also provide habitat for several rare plants and animals in the Chuckwalla region, most notably Mojave fringe-toed lizards, Harwood's milk-vetch, Harwood's eriastrum, Abram's spurge, jack-ass clover, and a potentially new species of saltbush recently discovered on the margins of Palen Dry Lake (Andre pers. comm.). The Project contributes—at least incrementally—to these significant cumulative effects. The Project also contributes to cumulatively considerable indirect effects to these NECO- and CNDDB-sensitive habitats, including interrupted aeolian (wind-deposited) and fluvial (water-deposited) sand transport systems, both of which contribute to the maintenance and sustainability of dune habitats; groundwater pumping (lowering groundwater tables has also been demonstrated to influence dune morphology [Langford et al 2009]); habitat fragmentation and degradation from roads and increased vehicle and human disturbance; an increase in avian predators of dune species from the increase in perching sites; and the spread of invasive non-native plants such as Sahara mustard, which is believed to be toxic to desert tortoise and other herbivores and can spread explosively in response to disturbance.

The Project's contribution to significant cumulative effects to sandy plains, sand drifts over playa, and dunes would be minimized to a level less than cumulatively considerable through implementation of staff's proposed Condition of Certification **BIO-20.** This requires acquisition of 190 combined acres of dunes, playa and sandy plains within Chuckwalla Valley. The Project's contribution to the cumulative loss of alluvial fans and bajadas is minimized through **BIO-12**, which requires protection of 1,864 acres of Sonoran creosote bush scrub, which inhabits these landforms that occur between the valley floor and the base of the adjacent mountains. The Project's contribution to the cumulative loss of desert washes will be addressed through **BIO-22**; 132 acres of desert washes and desert dry wash woodland would be protected within the Ford watershed or adjoining watersheds.

The Project's contribution to cumulatively significant indirect effects would be minimized to a level less than cumulatively considerable through implementation of Conditions of Certification **BIO-13** (Raven Management Plan), **BIO-14** (Weed Management Plan), **BIO-24** (revegetation of temporarily disturbed areas using locally native seed), and **BIO-25** and **BIO-26** (monitoring of groundwater-dependent vegetation and remedial action in the event of adverse effects).

Biological Resources Table 19
Cumulative Effects: Landforms/Wildlife Habitat

NECO Landform*	Total Landform* in NECO	Impacts to Habitat from Existing** Projects (Percent of all landform type in NECO)	Impacts to Habitat from Foreseeable Future*** Projects (Percent of all landform type in NECO)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects) [1]
Alluvial Fans/Bajadas	2,997,468 acres	42,619 acres 1.4%	217,761 acres 7.3%	1,809 acres 0.8%
Sand Dunes	150,136 acres	3,755 acres 2.5% of total	17,027 acres 11.3% of total	1 acre**** 0.2%
Pediments	139,282 acres	1,715 acres 1.2% of total	1,263 acres 0.9% of total	0 acres
Plains	408,453 acres	75,687 acres 18.5% of total	48,117 acres 11.8% of total	0 acres
Badlands	79,141 acres	40 acres 0.05% of total	1,203 acres 1.5% of total	0 acres
Lava Flows	180 acres	0 acres	0 acres	0 acres
Riverwashes	137,265 acres	1,475 acres 0.1% of total	6,896 acres 5.0% of total	74 acres**** 1.1%
Dry Playas	62,106 acres	1,348 acres 2.2% of total	9,423 acres 15.2% of total	37 acres**** 0.4%
Mesas	6,843 acres	2 acres 0.03%	0 acres	0 acres
Tilted Plateaus	8,979 acres	0.1 acres 0.001%	3,762 acres 42.0% of total	0 acres
Mountains	609,023 acres	1,468 acres 0.2% of total	8,682 acres 1.4% of total	0 acres

*Based on the NECO Landforms dataset (BLM CDD 2002); acreages for dunes and playa from this dataset differ from the acreages based on an analysis using the NECO plant communities dataset, due to differences in methodology, minimum mapping polygons, etc. Actual project-specific field survey data concluded that the project would directly affect 1 acres of stabilized and partially stabilized dunes.
** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see T Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in T Biological Resources Table 9
****Acreages reflect the ground-based and field-verified delineation of habitats, including the 1acre adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

Desert Dry Wash Woodland

Biological Resources Table 20 highlights the cumulative effects of existing and future projects to desert dry wash woodland within the immediate watershed encompassing the Project (**Biological Resources Figure 21**). The NECO plant communities dataset was used for this analysis, which is based largely on aerial photo interpretation. The Project's field-verified, ground-based delineation (TTEC 2010l) documented 16 acres of desert dry wash woodland (a microphyll woodland) along jurisdictional state waters features in the project footprint that would be directly impacted and reflects the field-verified, ground-based delineation of waters of the state. The NECO dataset and GIS-

based analysis showed a 165-acre area of desert dry wash woodland. The differences are presumably based on different methodologies (remote versus ground-based delineation) and different criteria for ‘membership’ in the microphyll woodland category; however, a large polygon of desert dry wash woodland that occurs just outside of the Project footprint along the Palen Wash may also account for the difference in acreage between the field-based delineation and the mapping of woodland in the NECO plant communities dataset, assuming the aerial photos were taken at different times and at different angles. Staff relies on the field-verified and ground-based delineation of habitats. The terms ‘desert dry wash woodland’ and ‘microphyll woodland’ are used interchangeably by Holland (1986) Barbour & Keeler-Wolf (2007) and in practice by BLM.

According to CEQA guidelines, seemingly minor impacts can be significant if they affect an extremely rare or limited resource, and the cumulative impact may be substantial. Desert dry wash woodland is a sensitive natural community recognized under many LORS and area plans. Because it has a limited distribution (relative to common and widespread communities such as Sonoran creosote bush scrub) and carries an ecological importance that is disproportionate to its limited extent, staff considers the combined loss of approximately 7 percent of desert dry wash woodland from future impacts to be a significant cumulative effect—an effect to which the Project contributes at least incrementally. Desert dry wash woodland and other wash-dependent habitat that occurs within the stream environment is regulated under Section 1600 of the California Fish and Game Code. These habitats are also recognized as sensitive communities in the NECO plan (BLM CDD 2002) and CNDDB (CDFG 2003).

This GIS analysis of direct habitat loss does not reflect the equally significant indirect effects that could be reasonably expected to result from all or most of the proposed future projects, including the Genesis Project: interrupted geomorphic processes downstream of the stream diversions and the loss of sediments critical to many rare plants; diverted stream flows and deprived stream reaches; fragmentation of the remaining habitat and diminished habitat function and value for wildlife; and invasion by tamarisk (a highly invasive noxious weed that displaces native riparian vegetation and depletes shallow groundwater). Miles of standing dead ironwood trees north of I-10 in the Corn Springs Area are a testament to the effects of channel diversions—even small channels—on desert riparian trees.

The Project’s contribution to cumulatively significant desert dry wash woodland impacts would be minimized to a level less than cumulatively considerable through a variety of measures. Condition of Certification **BIO-22** specifies acquisition and enhancement of 48 acres of desert dry wash woodland (16 acres mitigated at a 3:1 ratio) within or adjacent to the Chuckwalla-Ford Dry Lake watershed. The Weed Management Plan (**BIO-14**) would include tamarisk as a target for management, and **BIO-19**, Section A (special-status plant mitigation) specifies the modification of the engineered channel design to ensure that the discharge of the diverted flows is revised to align with the existing natural drainages delineated between the Project and Ford Dry Lake.

Biological Resources Table 20
Cumulative Effects: Desert Dry Wash Woodland

Desert Dry Wash Woodland – Chuckwalla Valley				
Plant Community*	**Total Plant Communities* in Chuckwalla Valley**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in **Chuckwalla Valley**)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in **Chuckwalla Valley**)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Desert Dry Wash Woodland/Microphyll Woodland	148,856 acres	4,645 acres 3.1%	10,950 acres 7.4%	16 acres**** 0.15%
Desert Dry Wash Woodland – NECO				
Plant Community*	**Total Plant Communities* in NECO**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in **NECO)**	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in **NECO**)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Desert Dry Wash Woodland/Microphyll Woodland	682,027 acres	8,457 acres 1.2%	48,167 acres 7.1%	16 acres**** 0.03%

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (Davis et al. 1998), updated during the NECO planning effort (see Appendix H of the NECO (BLM- CDD 2002).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9.
*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis.
****Acreages reflect the ground-based and field-verified delineation of habitats, including the 1acre adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

Active Dune Habitat in Chuckwalla Valley

This analysis highlights the cumulative effects of existing and proposed future projects on the most active portions of the dune ecosystem in Chuckwalla Valley: landforms mapped in the NECO landforms dataset as crescentic dunes, longitudinal dunes, and undifferentiated dunces. The Chuckwalla Valley dunes is a system that is isolated and distinct from other dune systems in NECO, and, like the Palo Verde mesa and Cadiz Valley areas, it is an area that would be disproportionately affected by proposed renewable energy projects.

Dunes provide essential habitat for a disproportionate number of special-status animals and plants. Locally these species include: Mojave fring-toed lizard; Harwood's eriastrum; Harwood's milk-vetch; jack-ass clover; Abram's spurge; several rare cryptantha species, and a potentially new species of saltbush (*Atriplex* sp. nov. J. Andre) recently discovered around the margins of Palen Dry Lake (documented) and Ford Dry Lake (reported). In nearby Coachella Valley, the dune ecosystems are home to a wide variety of rare and endemic, threatened and endangered plants and animals, including several rare dune endemic invertebrates. Dunes are also BLM NECO sensitive communities and recognized as rare natural communities in the CNDDB (CDFG 2003). As noted above, even seemingly minor impacts may be considered significant if they affect an extremely rare or limited resource.

Biological Resources Table 21 and **Biological Resources Figure 20** quantifies the cumulative effects of the existing and future projects on “active” dune formations in the NECO planning area; the extent of other less active aeolian-deposited and stream-deposited sands within the aeolian sand transport corridor are better reflected in the habitat model for Mojave fringe-toed lizard (**Biological Resources Figure 8** and **9**, and **Biological Resources Table 14**). The habitat model for Mojave fringe-toed lizard includes also sandy plains, and sand-covered alluvial fans; all or portions of these landforms appear to be located within the wind-sand transport corridor but occur in the less active outer portions beyond the more active dunes (Worley-Parsons 2010c, 2010d; Collison 2010).

The direct loss of habitat quantified in **Biological Resources Table 21** is only part of the picture of cumulative effects; staff also considers the Project’s likely indirect effects, which, when combined with similar effects from other probable future projects, are severe. These include: the degradation and eventual loss of habitat from obstructions in the wind transport corridor; depriving the dunes downwind of the fine windblown sands that build and maintain the habitat and ensure its suitability for Mojave fringe-toed lizard. In the absence of regular fresh input of fine, windblown sands, the deprived dunes quickly become stabilized, vegetate, compact, and develop a surface lag of coarse sand or gravel that combine to render the habitat unsuitable for the many plants and animals that have evolved to the unique, always shifting, natural disturbance regime of the dunes. The Project contributes at least incrementally to this cumulatively significant effect. Other reasonably foreseeable indirect effects of existing and future impacts to dune habitat not reflected in this quantitative analysis include: fragmentation and degradation of remaining habitat by roads and the resulting loss of gene flow between isolated populations; unauthorized off-road vehicles increased by the construction of new roads into previously inaccessible areas, altered drainage patterns, and the spread of noxious weeds such as Russian thistle and Sahara mustard, which prematurely stabilize the dunes and make the habitat less suitable for dune-dependent rare plants and fringe-toed lizard (Barrows pers. comm; Barrows et al. 2009; Griffiths et al. 2002). Habitat values for dependent wildlife are also affected by increased predation from avian predators, which benefit from the new perching structures that the solar facilities provide. Recent research in New Mexico has confirmed that groundwater is a key feature that contributes to dune morphology; dune fields are shaped by a feedback between aeolian dynamics and groundwater chemistry (Langford et al. 2009). The combined effects of groundwater pumping may also cause a significant cumulative effect on dune habitat, an effect to which the Project contributes at least incrementally.

Biological Resources Table 21 illustrates the significant cumulative effects to active dunes expected to occur in the Chuckwalla Valley; over 1,600 acres of active dunes would be directly affected by habitat loss alone. Please also see **Biological Resources Figure 8** and **9**, and **Biological Resources Table 15** for a summary of the Mojave fringe-toed lizard habitat model, which includes sandy plains and sand-covered alluvial fans (in addition to more active dune landforms). All or portions of these landforms are located within the wind-sand transport corridor but occur in the less active outer portions beyond the more active dunes (barchan dunes, etc.).

The combined loss of dune habitat from the Project and other probable future projects is a significant. Although the Project’s contribution to the loss of habitat is less than

cumulatively considerable, it also contributes to a significant-to-severe cumulative effect from all the anticipated indirect effects described above. According to CEQA guidance, in situations where the cumulative impact is severe, even small incremental impacts may be cumulatively considerable. The Project's contribution to these effects would be minimized to a level less than cumulatively considerable through implementation of the following conditions of certification: **BIO-20** for acquisition and protection of 190 acres of dunes and sand drifts over playa in Chuckwalla Valley; **BIO-13** (Raven Management Plan); **BIO-14** (Weed Management Plan); **BIO-24** (revegetation plan for temporary disturbance), and **BIO-25** and **BIO-26** for monitoring groundwater-dependent vegetation and remedial action in the event that adverse effects are detected.

Biological Resources Table 21
Cumulative Effects: Active Dune Habitat

Total Dune habitat* in Chuckwalla Valley	**Impacts to Dune Habitat from Existing** Projects** (Percent of all dune habitat in Chuckwalla Valley)	**Impacts to Dune Habitat from Foreseeable Future*** Projects** (Percent of all dune habitat in Chuckwalla Valley)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
25,463 acres	1,049 acres 4.1% of total	1,607 acres 6.3% of total	0 acres**** (1 acres/1.7%)

1 = Acreages adjusted to reflect removal of the 41.4 acre "toe" (TTEC 2010o).
*Based on the BLM NECO Landforms dataset (BLM CDD 2002) for the following values: crescentic dunes, longitudinal dunes, and undifferentiated dunes. Actual project-specific field survey data concluded that the project would directly affect 28 acres of stabilized and partially stabilized dunes. Additionally, approximately 453 acres of habitat downwind of the solar fields would be indirectly affected (**Soil & Water Appendix A**).
** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
**** Acreage shown based on NECO landforms dataset (BLM CDD 2002); Applicant's ground-based delineation of habitat shown in parentheses () below (GSEP 2009a).

SPECIAL-STATUS PLANTS

Staff's analysis of cumulative impacts to special-status plants relied on three types of analyses: 1) a quantitative GIS-based analysis of impacts to essential habitat using NECO landforms and/or natural community datasets, and the USGS National Hydrographic Dataset; 2) a careful review of the Consortium of California Herbaria (CCH 2010) to determine if there were additional documented occurrences that were not already included in CNDDB (2010) and 3) the occurrence data was loaded into an ESRI GIS-based web application that allowed staff to view all CNDDB and CCH occurrences overlain on various jurisdictional, biological, landform, utility, USGS topographic maps and aerial imagery. This allowed staff to better understand a species' threats and management vulnerabilities relative to probable future renewable energy projects throughout their range, their distance and proximity to projects or features, their peripheral status, their eco-geographic variation or diversity, potential for fragmentation and other indirect effects from nearby development, and ownership and management threats to remaining occurrences. A complete list of datasets that were utilized in this web-application is included in staff's analysis of direct impacts to plants (see Section C.2.4.2).

Many new occurrences of Harwood's milk-vetch have been found at three of the proposed solar projects in the I-10 corridor; in a good rainfall year, it appears to be fairly well distributed in the dune habitats in the Chuckwalla Valley. Of the 46 total

occurrences (CNDDB and CCH); 11 are historical occurrences and of the remaining 35, no more than 10 appear to be protected in federal wilderness or state park ownership. Of the 25 occurrences not protected, 10 of these would be affected by renewable energy projects alone. It is important to note, however, that survey data from the proposed projects has not yet been incorporated into CNDDB, and the preliminary data. Staff also expects that many of these new occurrences would also be directly or indirectly affected by the Projects whose surveys resulted in their discovery.

Significant cumulative indirect effects that are likely to occur include: altered drainage patterns, disrupted wind- or fluvial-sand transport processes, fragmentation of the habitat and reduced gene flow between isolated populations, the spread of non-native plants, and an increased risk of fire. Climate change is expected to exacerbate the effects of drought, and CO_2 concentration has already been demonstrated to promote the spread of invasive plants. Global warming is expected to disproportionately affect annual species in the Sonoran Desert region, according to a recent study by the University of Arizona.

Biological Resources Table 15 and **Biological Resources Figure 23** quantifies the cumulative effects of the BLM renewable energy projects and other existing and future projects to the sandy substrates associated with this special-status plant. The NECO landforms dataset was used; landforms selected to create the simple model of potential habitat include sandy dissected fans, sandy plains, fans, dissected fans, undifferentiated plains, and undifferentiated dunes. This was based on a careful review of the landforms dataset overlaid with known occurrences of Harwood's milk-vetch from CNDDB occurrences and the Project-specific survey data. Staff expects that this model somewhat over-represents actual suitable habitat for Harwood's milk-vetch but it cannot be refined until the more detailed soil mapping for the region is available (currently in development by the Natural Resources Conservation Service). However, the mapping of habitat should not be misconstrued to conclude that all the habitat is potentially occupied; rare plants have very specific microhabitat requirements that are often poorly understood. Actual distribution within mapped habitat is often confined to small or scattered and infrequent occurrences within an already restricted range. Rare plants can also sometimes be locally abundant but highly restricted in their range. Harwood's milk-vetch habitat would be disproportionately affected (almost 9 percent of its habitat in NECO) by the push for renewable development in NECO, and the species' range in California is nearly restricted to the NECO planning area. In the Chuckwalla Valley, 12.9% of its habitat is affected by probable future projects and 8.3% has already been lost (see **Biological Resources Table 15** for Mojave fringe-toed lizard, which occupies similar sandy habitat). The loss of habitat quantified in the GIS analysis does not reflect the combined indirect effects of spread of noxious weeds, fragmentation and reduced gene flow among isolated populations from existing and future projects.

The combined loss of Harwood's milk-vetch habitat, the cumulative indirect impacts to documented occurrences, and the ownership and management threats to remaining occurrences are cumulatively significant. Although the Project's contribution to these effects may be small, it contributes, at least incrementally to a significant cumulative effect. According to CEQA guidance, in situations where the cumulative impact is substantial, even small incremental impacts may be cumulatively considerable.

Other species restricted to dune and playa habitats, washes and other sandy habitats have occurrences outside of federal wilderness or state park lands and are threatened by renewable energy development, but the cumulative effects to Harwood's milk-vetch are of particular concern due to the position of many occurrences in the immediate vicinity of probable future projects and the likelihood of significant indirect effects. These include: lobed ground cherry, Las Animas colubrina, Abram's spurge, jack-ass clover, California and glandular ditaxis. Harwood's eriastrum is somewhat more affected than these aforementioned plant species, and dwarf germander and flat-seeded spurged have very few documented occurrences in California. They also have occurrences that are not protected in federal wilderness designation or in national or state park ownership.

Populations of most special-status plants in this region of California were considered relatively stable until recently, as the push for renewable energy development has placed many plants and occurrences at risk. The Project's contribution to these effects, and to cumulative effects to other special-status plants found in the Project area, would be less than cumulatively considerable through implementation of the following conditions of certification: **BIO-19**, which includes detailed specifications for avoidance and minimization measures, and criteria and performance standards for off-site mitigation through acquisition of rehabilitation of degraded populations; **BIO-20** for acquisition and protection of 190 acres of dunes and sand drifts over playa in the Chuckwalla Valley; **BIO-14** (Weed Management Plan), and **BIO-22** for acquisition of desert washes (at a 3:1 ratio) in the Chuckwalla-Ford Dry lake watershed.

It is likely that implementation of **BIO-19** will require compensatory mitigation, and avoidance and minimization measures for impacts to special-status plants, and the dunes, playas, sand drifts, and desert washes that support the majority of rare plants in the valleys and low-lying areas affected by renewable energy development. There may be cumulative impacts after mitigation is implemented by all projects, but due to the mitigation implemented by the Project, its contribution would be less than cumulatively considerable. The residual cumulative effects from all future projects, after mitigation could be addressed through a regional and coordinated planning effort aimed at preserving and enhancing remaining populations and their essential habitat, and restoring degraded populations.

Groundwater-Dependent Vegetation

The groundwater cumulative impact analysis (see **Soil and Water Resources**, Section C.7.4.2) indicates that groundwater extraction during construction and operation of this and other foreseeable projects would place the basin into an overdraft condition. This impact may be exacerbated by other unidentified renewable energy projects in the I-10 corridor, which has been targeted as a potential area for further renewable energy development. However, staff concluded that the amount of water that is stored in the basin greatly exceeds the amount of cumulative overdraft, even taking into account other reasonably foreseeable future projects, rendering the project's contribution to this cumulative impact less than cumulatively considerable.

Nevertheless, the proposed Project would have an impact on the deep aquifer groundwater levels within the area immediately surrounding the proposed Project pumping well. The area of potential affect surrounding the well is estimated to extend

approximately 10 miles out from the Project pumping well by the end of Project operation. The Applicant has stated that pumping from the deeper aquifer would not affect the shallow alluvial-fill aquifer that supports groundwater-dependent vegetation within this zone of potential effect based on the presence of low permeability clay layers between the shallow and deep aquifers observed at the test well onsite, and that characteristically occur around lakebeds. However, the calculations and assumptions used to evaluate potential groundwater level impacts are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely.

Although the Project's contribution to the cumulative effects of probable future projects to drawdown of the spring baseline water tables is minor—due in part to its position at the far east end of the valley—it contributes, at least incrementally to a significant, and potentially severe, cumulative effect. According to CEQA guidance, in situations where the cumulative impact is substantial, even small incremental impacts may be cumulatively considerable. Implementation of Conditions of Certification **BIO-25, BIO-26**, and **SOIL& WATER-3**, **-4**, and **-5** would ensure that the Project's proposed use of groundwater and effect on groundwater dependent vegetation would be less than cumulatively considerable, **BIO-25** provides detailed specifications, minimum standards, and reporting requirements for monitoring the groundwater-dependent vegetation and spring groundwater levels within the 10-mile area of effect around the Project pumping well. **BIO-26** outlines the thresholds for remedial action and performance standards for the mitigation in the event that adverse effects are detected.

Overview: Cumulative Impacts to Biological Resources of the Chuckwalla Valley

The indirect effects of past, present, and foreseeable future development of the Chuckwalla Valley will contribute cumulatively to the overall loss of dune habitat, desert washes, and the fragmentation and degradation of the remaining habitat for Mojave fringe-toed lizard and several dune-dependent rare plant species. The indirect cumulative effects of development on dune ecosystems are not represented in the GIS analysis of direct habitat loss, but such effects are well documented in Coachella Valley--a comparable and suitable reference site from which conclusions may be reasonably drawn about the environmental stressors and their effects. The Chuckwalla Valley system, although not nearly as fragmented as Coachella Valley, has already been adversely affected in many ways. Proposed renewable energy development in Chuckwalla Valley could threaten what remains of the habitat and places several populations at risk—most notably, the local Chuckwalla Valley population of the Mojave fringe-toed lizard. Past and present impacts in Chuckwalla Valley that have already contributed to a decline in the quality and extent of aeolian dune habitat, habitat for Mojave fringe-toed lizard and dune-dependent rare plant species, desert washes and wash-dependent vegetation, include:

- Compaction and habitat degradation from historic military training operations during World War II;
- Past off-road vehicle use and present/future unauthorized use around Ford Dry Lake;
- Past sheep grazing around Ford Dry Lake;

- Electric and Natural Gas Transmission line construction;
- Road construction associated with the transmission construction;
- Construction and operation of the Wiley Wells Rest Stop;
- Construction of Interstate 10 and the network of diversion dikes south of I-10;
- State Highway 177 and a network of both paved roads and unimproved roads;
- Urban and agricultural conversion around Desert Center (8,424 acres);
- Blythe Energy and DPV 1 transmission lines and access roads; and
- Construction of the Colorado Aqueduct; and
- Chuckwalla Valley State Prison

Dikes associated with I-10 limit the depositional area of the Chuckwalla Mountains bajada to the south (upstream) of I-10 and concentrate the flows into three discrete channels, where historically numerous small channels fanned out over large areas contributing to fluvial sediment to the aeolian system. The downstream effects of these diversions are striking, severe, and very apparent throughout the I-10 corridor to the north, and in comparisons of current and historical photos. The perimeter stormwater conveyance channels proposed with nearly every solar project would closely mimic these downstream effects to fluvial transport systems. Russian thistle, a noxious weed, has replaced native plant diversity in some dune habitats. More recently, Sahara mustard has invaded the valley and spread explosively since it was introduced some decades ago. Invasive plants increase fire frequency and are correlated with population declines of milk-vetch and fringe-toed lizard in Coachella Valley (Barrows and Allen 2007).

A list of the existing and probable future projects considered in the NECO-wide analysis of cumulative effects is provided in **Biological Resources Table 9**. A subset of probable future renewable energy projects that occur in Chuckwalla Valley are listed below, including those that occur in the portion of the valley and dune system south of I-10.

<u>Reasonably foreseeable future actions</u> that will further contribute to the loss of habitat, desert washes and wash-dependent vegetation, and to the fragmentation and degradation of dunes and adjacent habitat for fringe-toed lizard and dune-dependent rare plant species in Chuckwalla Valley include:

- Palen Solar Power Project (3,001 acres)
- Genesis Solar Energy Project (1,797 acres)
- Chuckwalla Solar 1 (4,091 acres)
- EnXco 2 (Solar Energy Project, 1,325 acres)
- First Solar – Desert Sunlight (5,119 acres)

On the dunes south of I-10:

- Colorado Substation (approximately 80 acres)
- DPV 2 and Desert Southwest transmission lines and access roads
- LightSource Renewables – Mule Mountain II
- Altera - Mule Mountain (6,618 acres).

In the Coachella Valley, blocked sand/wind corridors have been shown to lead to sand compaction and premature stabilization of the dunes, increased mean grain size (which reduces habitat suitability for fringe-toed lizards), and aeolian habitat loss. Stabilization of the dunes is also aggravated by an increase in invasive exotic plants, introduced through soil disturbance and an increase in vectors (vehicles). Invasive plants are correlated with decreases in the rare dune-endemic species of milk-vetch, fringe-toed lizard, and endemic sand-treader crickets in Coachella Valley.

Road construction associated with new solar projects and their related transmission corridors further degrade and fragment the habitat, and lead to an increase in vehicle traffic and encroachment in previously undisturbed areas. Unpaved roads into the valley interior and historical grazing have led to a dramatic increase in noxious weed invasion over large areas of dunes and surrounding habitat. New roads into otherwise undisturbed portions of the valley also lead to an increase in vehicle-related mortality, and habitat destruction from unauthorized off-road vehicle use. Human encroachment, agriculture, and development around Desert Center are also accompanied by an increase in predators, such as ravens. These indirect cumulative effects on dune-dependent species are particularly acute in isolated, fragmented habitats that lack the buffering effects of connectivity to larger populations. All of these stressor and effects are documented to have led to the decline of dune ecosystems in Coachella Valley and can reasonably be expected to occur in Chuckwalla Valley with future development.

C.2.8.8 CONCLUSION

Construction and operation of the Genesis Project will contribute, at least incrementally, to a significant cumulative effect in nearly every resource area analyzed. Cumulative impacts in some areas—impacts to dunes and playa habitat, desert washes, Harwood's milk-vetch—are substantial. "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. Cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant merely because the contributions represent a small percentage of the overall problem.

The biological resources cumulative effects analysis employed a quantitative, GIS-based analysis of direct impacts to habitat and a qualitative analysis of indirect effects (e.g., increases in predators, noxious weeds, etc.). In many cases, the anticipated indirect impacts are more significant, or adverse, than the direct loss of habitat, but are more difficult to quantify. In preparing the qualitative assessment of indirect cumulative effects, staff relied on consultations with regional experts and agency biologists, a literature review of the threats to species and their habitats, and documented observations and studies from Coachella Valley, a dune system west of Chuckwalla

Valley that supports many related species and similar habitats (Barrows 1996; Barrows & Allen 2007; CVAG 2007; Griffiths et al. 2002; Katra et al. 2009; Turner et al. 1984; Weaver 1981; Barrows pers. comm.).

The geographic scope of the cumulative effects analysis varied between the biological resources. Many of the analyses used the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) boundaries (BLM-CDD 2002). The NECO boundary closely approximates the boundaries of the Eastern and Northern Colorado Desert Tortoise Recovery Units; however, the recovery unit boundaries extend slightly to the north and west of the NECO boundary. For some resources, a different geographic scope was warranted, such as the use of watershed boundaries to analyze cumulative effects to desert washes, or the Chuckwalla Valley region of the I-10 corridor for populations or dune systems restricted to that geographic area.

Significant cumulative effects (including indirect effects) were identified in a number of biological resource areas where the Project contributes—at least incrementally—to the cumulative effect. These include:

- Desert washes – Chuckwalla - Ford Dry Lake Watershed and the broader NECO planning area;
- Desert tortoise habitat;
- Golden eagle foraging habitat;
- Mojave fringe-toed lizard and their habitat;
- Habitat for American badger, desert kit fox, and burrowing owl;
- LeConte's thrasher habitat;
- Couch's spadefoot toad range;
- Habitat for Harwood's milk-vetch and other dune/playa-dependent special-status plants;
- Wildlife habitat and connectivity within the Palen-Ford WHMA (for Mojave fringe toed lizard, dunes, and playa);
- Mojave and Sonoran creosote bush scrub; desert dry wash woodland (microphyll woodland); playa and sand drifts over playa, and dunes (active and stabilized)

Of particular concern are the cumulative effects of renewable energy projects within the geographic scope of the Chuckwalla Valley, which contains an isolated system of dunes and population of Mojave fringe-toed lizard. The direct loss of dune habitat and Mojave fringe-toed lizard is minor relative to the indirect downwind effects from obstructions within the active aeolian sand transport corridor, and the disruption of the fluvial processes that contribute sand to the system from the diversion of washes – approximately 63 miles of washes within the Chuckwalla-Ford Dry Lake watershed alone. Lessons learned from decades of study at nearby Coachella Valley (a comparable and suitable reference site from which conclusions may be reasonably drawn about Chuckwalla Valley) suggest that these indirect effects are significant and adverse. In addition to the disruption of geomorphic processes, significant indirect effects that can be reasonably expected to occur in the Chuckwalla system from future

projects include fragmentation and its effects on connectivity and gene flow; spread of invasive non-native plants; increase in avian predators, and; an increase in vehicle-related wildlife mortality.

In a recent study “Climate Change and the Future of California's Endemic Flora” (Loarie et al 2009), anticipated climate change is projected to cause greater than 80 percent reductions in range size for up to 66% of California’s endemic species within a century. These results are comparable to other studies, but projected reductions depend on the magnitude of future emissions and on the ability of species to disperse from their current locations. California's varied terrain could cause species to move in very different directions, breaking up present-day floras. However, these projections also identify regions where species undergoing severe range reductions may persist. Protecting these potential future refugia and facilitating species dispersal will be essential to maintain biodiversity in the face of climate change (Loarie et al 2009). These include the cooler, more mesic microclimates of the mountainous areas, which may protect significant components of biodiversity into the next century. Many of these areas are already in some degree of federal wilderness protection. However, the value of these refugia depends critically on the ability to of species to disperse, underscoring the importance of landscape connectivity and potential restoration in the face of increasing urbanization, land use change, and disturbance.

The proposed Project is expected to contribute to a cumulative reduction in greenhouse gases. However, the benefits gained by the Project’s reduction in greenhouse gases must also be weighed against the potential loss of carbon sequestration benefits from the desert vegetation and biological soil crusts.

A recent study conducted in the Mojave Desert found that the desert soil ecosystems could represent a significant carbon sink (Campbell et al. 2009). Whether a result of biotic crusts, vegetation, alkaline soils, or an increase in average precipitation, the rate of carbon absorption in the soil has scientists considering whether desert ecosystems play a more critical role in the carbon cycle than previously believed (Stone 2008; Campbell et al. 2009). Some scientists, however, dispute these findings and attribute them to an anomaly caused by increased rain for the study period reported (Campbell et al. 2009). A study is currently underway by the University of Oregon “to determine whether the installation and operation of solar thermal plants will impact carbon sequestration capabilities of the Mojave Desert ecosystem and ecosystem services (assessment endpoint) to the extent that more carbon is released or inhibited from being stored than saved while utilizing solar technology.” (Campbell et al. 2009). Until the dispute is resolved, staff expects that the answer may vary somewhat on a case-by-case basis. For example, project sites that are very sparsely vegetated with only a minor component of soil crusts may confer less sequestration capabilities than sites with a rich cover of biological soils crusts and succulent desert scrubs.

Nevertheless, there is little dispute that the loss of desert vegetation and biological soil crusts on a solar thermal plant site permanently eliminates the carbon sequestration benefits, and the soil disturbance during grading and construction releases the stored carbon back into the atmosphere. Staff believes that the cumulative loss of sequestration benefits and release of stored carbon from all past, present, and probable future projects is likely to be significant. With implementation of the avoidance and

minimization measures (**BIO-8**), revegetion plan for temporarily disturbed area (**BIO-24**), compensating for habitat loss by preventing the future development of desert lands through acquisition and permanent protection under conservation easements (**BIO-12, BIO-19, BIO-20** and **BIO-22**), restoring degraded portions of acquired lands (**BIO-12** and **BIO-19**), minimizing the size of the disturbance area along the linears (**BIO-8 and BIO-19**), and revegetating after closure and decommissioning (**BIO-23**), the Project's contribution to the cumulative effects described above would be less than cumulatively considerable.

Compliance with the mitigation measures identified by staff would reduce the Project's contribution to cumulative effects to a level that is less than cumulatively considerable. There may be cumulative effects after mitigation is implemented by this project, but mitigation would reduce this project's contribution to a level that is not cumulatively considerable. These residual cumulative effects from all past, current, and future projects could be addressed through a regional and coordinated planning effort aimed at: preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors, and identifying and preserving important refugia to facilitate species dispersal and maintain biodiversity in the face of climate change.

In addition to addressing the residual ecological impacts, after mitigation to less than significant levels, these coordinated planning efforts by state and federal agencies must also address the cumulative loss of carbon sequestration benefits from the loss of desert vegetation and biological soil crusts, and the concurrent release of stored carbon back into the atmosphere during grading and construction is significant. These could be addressed through coordinated planning efforts aimed at: creating incentive programs for energy efficiency and conservation; funding research that analyzes alternative energy options that are less land intensive; reducing the number of permitted projects and creating solar exclusion zones in areas of high ecological values and carbon sequestration potential; restoring or better utilizing degraded desert lands; and restoring the carbon sequestration benefits of damaged desert (and especially) forest ecosystems elsewhere (Campbell et al. 2009).

Ongoing collaborative efforts by federal and state agencies to develop a Desert Renewable Energy Conservation Plan and BLM's Solar Energy Development Programmatic EIS offer an appropriate forum for such planning. **Appendix B** describes the Desert Wildlife Management Area management strategies that could achieve the goals of preservation and enhancement of wildlife connectivity in the NECO planning area. Staff supports these programmatic efforts and believes they represent an excellent means of integrating the State's and BLM's renewable resources goals and environmental protection goals.

C.2.9 COMPLIANCE WITH LORS

The proposed Project must comply with state and federal laws, ordinances, regulations, and standards that address state and federally listed species, as well as other sensitive species and their habitats.

C.2.9.1 STATE LORS

Under the Warren-Alquist Act (Public Resources Code § 25500) the Energy Commission's certificate for thermal power plants 50 MW and more is "in lieu of" other state, local, and regional permits (*ibid*.). Staff has incorporated all required terms and conditions that might otherwise be included in state permits into the Energy Commission's certification process. When conditions of certification are finalized they would satisfy the following state LORS and take the place of terms and conditions that, but for the Commission's exclusive authority, would have been included in the following state permits:

Incidental Take Permit: California Endangered Species Act (Fish and Game Code §§ 2050 et seq.) The California Endangered Species Act (CESA) prohibits the "take" (defined as "to hunt, pursue, catch, capture, or kill") of state-listed species except as otherwise provided in state law. Construction and operation of the proposed Project could result in the "take" of desert tortoise, listed as threatened under CESA. Energy Commission staff's proposed Condition of Certification **BIO-12** specifies compensatory mitigation for desert tortoise habitat loss at a 1:1 ratio. Energy Commission staff have concluded that this funding and mitigation approach would ensure compliance with CESA.

Streambed Alteration Agreement: California Fish and Game Code §§ 1600 1607. Pursuant to these sections, CDFG typically regulates all changes to the natural flow, bed, or bank, of any river, stream, or lake that supports fish or wildlife resources. Construction and operation of the Project would result in direct impacts to 91 acres of waters of the state and 21 acres of indirect impacts. Staff's proposed Condition of Certification **BIO-22** would minimize and offset direct and indirect impacts to state waters and would assure compliance with CDFG codes that provide protection to these waters.

C.2.9.2 FEDERAL LORS

The Genesis Project is located on federal land under BLM's jurisdiction and is therefore subject to the provisions of BLM's California Desert Conservation Area (CDCA) Plan (BLM 1999). As an amendment to the CDCA Plan, BLM produced the Northern and Eastern Colorado Coordinated Management Plan (NECO) (BLM CDD 2002). The NECO Plan provides for conservation and management of special status species through a system of management areas including: Desert Wildlife Management Areas (DWMAs), multi-species Wildlife Habitat Management Areas (WHMAs), bighorn sheep WHMAs, Areas of Critical Environmental Concern (ACEC), and wilderness areas.

- **Desert Wildlife Management Areas (DWMA)** are general areas recommended by the Desert Tortoise Recovery Plan (USFWS 1994) within which recovery efforts for the desert tortoise would be concentrated. DWMAs had no specific legal boundaries in the 1994 Recovery Plan. The BLM formalized the general DWMAs from the 1994 Recovery Plan through its planning process and administers them as Areas of Critical Environmental Concern (see below). The linear facilities south of I-10 pass through the Chuckwalla DWMA.
- **Area of Critical Environmental Concern (ACEC)** are specific, legally defined, BLM designations where special management is needed to protect and prevent

irreparable damage to important historical, cultural, scenic values, fish and wildlife, and natural resources or to protect life and safety from natural hazards. Besides the Chuckwalla DWMA/ ACEC, the Genesis Project is not included within a designated ACEC, but the Palen Dry Lake ACEC is located to the west.

- **Critical Habitat** consists of specific areas defined by the USFWS as areas essential for the conservation of the listed species, which support physical and biological features essential for survival and that may require special management considerations or protection. Critical habitat for the desert tortoise was designated in 1994, largely based on proposed DWMAs in the draft Recovery Plan. The linear facilities overlap with 23 acres of the Chuckwalla Desert Tortoise Critical Habitat Unit.
- **Wildlife Habitat Management Areas a**ddress other special status species and habitat management in the NECO, and include two kinds: one for bighorn sheep, one for all other special status species and habitats. Bighorn sheep WHMAs overlay the entire range of their occurrence and movement corridors. Multi-species WHMAs are complementary to existing restricted areas and DWMAs, which also cover other special status species and habitats. The plant site and portions of the linear facility routes are situated within the Palen-Ford Multi-Species WHMA.
- **Wilderness Area** The Project is contiguous and south of the 259,000-acre Palen/McCoy Wilderness, which includes the Granite, McCoy, Palen, Little Maria and Arica Mountains, five distinct mountain ranges separated by broad sloping bajadas.
- **Endangered Species Act (ESA; 16 USC Section 1531 et seq.).** Potential take of the desert tortoise, listed as threatened by the USFWS, requires compliance with the federal Endangered Species Act (ESA) (16 USC §§ 1531 et seq.). “Take” of a federally-listed species is prohibited without an Incidental Take Permit, which would be obtained through a Section 7 consultation between BLM and the USFWS. The Applicant will submit a Draft Biological Assessment (BA) for the Project to BLM, and when BLM has reviewed and made appropriate revisions to the draft BA it will be submitted to the USFWS so that the formal Section 7 consultation process can be initiated.
- **Bald and Golden Eagle Protection Act (Title 16, United States Code, Sections 668-668c)** A recently issued Final Rule (September 2009) provides for a regulatory mechanism under the Bald and Golden Eagle Protection Act (Eagle Act) to permit take of bald or golden eagles comparable to incidental take permits under the ESA. This rule adds a new section at 50 CFR 22.26 to authorize the issuance of permits to take bald eagles and golden eagles on a limited basis. The proposed Project could potentially result in “take” of the golden eagle from disturbance to nesting pairs as well as loss of foraging habitat. Implementation of Condition of Certification **BIO-28** would avoid of golden eagles by monitoring eagle nests during construction and implementing adaptive management measures. Staff’s proposed Condition of Certification **BIO-12** requires the acquisition of desert tortoise habitat that would also provide suitable eagle foraging habitat. While acquisition does not address the net loss of foraging habitat in the immediate future, it would prevent future losses of habitat by placing a permanent conservation easement and deed restrictions on

private lands. With implementation of staff's proposed Conditions of Certification **BIO-28** and **BIO-12** the proposed project would be in compliance with the Eagle Act.

C.2.10 NOTEWORTHY PUBLIC BENEFITS

The Genesis Project and the proposed alternative would result in significant impacts to sensitive biological resources, and would permanently diminish the extent and value of native plant and animal communities in the region. Staff has therefore concluded that the Genesis Project would not provide any noteworthy public benefits related to biological resources, despite the contributions the Project would make to meeting federal and state mandates for development of renewable energy resources.

C.2.11 RESPONSE TO PUBLIC AND AGENCY COMMENTS

Staff received comments on the Biological Resources section of the SA/DEIS and on the November 23, 2009 Notice of Intent to Prepare an Environmental Impact Statement. Comments on biological resources were received from the following parties:

- California Unions for Reliable Energy, May 13, 2010
- Kenneth Waxlax, Peter Murray and Associates Real Estate, May 7, 2010
- Defenders of Wildlife, December 23, 2009
- Western Watersheds Project, December 23, 2009
- Center for Biological Diversity, December 23, 2009
- California/Nevada Desert Energy Committee of the Sierra Club, December 23, 2009
- Californians for Renewable Energy, December 23, 2009
- U.S. Environmental Protection Agency , November 30, 2009

California Unions for Reliable Energy Letter Dated May 13, 2010

CURE Comment #1: CURE comments that the SA/DEIS lacks the information necessary to analyze the Project's potentially significant impacts, and therefore the SA/DEIS must be revised to inform the public and decision makers of the Project's significant impacts, and to avoid or reduce environmental damage when possible by requiring alternatives or mitigation measures.

> Staff Response: Staff does not agree that more information is needed to come to conclusions about the significance of Project impacts to biological resources, or to develop mitigation measures that would reduce impacts to less than significant levels. For those few areas in which staff is still awaiting survey results (i.e., late season rare plant and golden eagles), staff has developed mitigation measures based on conservative assumptions that sensitive biological resources may be directly or indirectly impacted by the Project. Staff has assumed that golden eagles could be nesting in close proximity to Project construction, and has measures in **BIO-28** to monitor the nest territories during construction and has recommended mitigation to avoid disturbance to nesting activities. Similarly, even if late summer/fall floristic surveys detected an extremely rare plant species on

the Project site, **BIO-19** provides all the tools needed to avoid and minimize significant impacts, including specifications for avoidance and minimization measures, thresholds for assessing significance of impacts to late season special-status plants and conditions under which avoidance or off-site mitigation would be required, and detailed guidelines for off-site mitigation through acquisition or restoration/enhancement. **BIO-19** includes detailed performance standards, monitoring, and reporting requirements for the mitigation.

CURE Comment #2: CURE comments that the SA/DEIS' baseline method, in some instances, blatantly violates the requirements of CEQA. By relying upon incomplete data, the SA/DEIS did not adequately establish the environmental setting for biological resources in the Project area, a necessary prerequisite to conducting an adequate impact analysis under CEQA.

Staff Response: CEQA requires a description of the physical environmental conditions in the vicinity of the project and notes the importance of knowledge of the regional setting in assessing impacts, and further specifies that special attention be paid to biological resources that are rare or unique to the region (Section 15125 (a) and 15125(c)). A discussion of baseline conditions in the Project site and vicinity is presented in subsection C.2.4.1, and contains a level of detail sufficient to allow staff to assess the impacts of the Project. Although some biological survey results were unavailable, staff had access to sufficient data to establish regional knowledge and reasonable assumptions regarding the presence of biological resources within the project area and vicinity (i.e., baseline) and, where necessary, supplemented the Applicant's data through coordination with local experts and regulatory agencies to ensure a full understanding of the Project site.

CURE Comment #3: CURE comments that the SA/DEIS' baseline method, in some instances, blatantly violates the requirements of CEQA. By relying upon incomplete data, the SA/DEIS did not adequately establish the environmental setting for biological resources in the Project area, a necessary prerequisite to conducting an adequate impact analysis under CEQA.

Staff Response: To establish a proper environmental baseline for floristic species, staff consulted with numerous local botanical experts on the development of potentially occurring plant species, the rarity of these species, and their likelihood of occurrence in the Project area. Staff also relied on a thorough GIS analysis of the distribution and range of late-season special-status plants throughout the Sonoran Desert and eastern Mojave Desert of California, and consulted a wide variety of sources. These are described in detail in the impact analysis of this Revised Staff Assessment. Staff agrees that late summer/fall surveys are necessary and has revised **BIO-19** to require the applicant to conduct late-season fall surveys for a number of late-blooming plant species that can only be detected during summer and/or fall months. The data and information the botanical experts provided were also used in the development of an appropriate late-season plant survey protocol provided in **BIO-19**. Although complete rare plant survey results were not available for staff in preparation of the Revised Staff Assessment, staff used the best available

scientific information to assess Project impacts to special-status plants, and provided detailed and specific triggers for mitigation and performance standards for avoidance, minimization, and compensatory mitigation to ensure that any special-status plants found are mitigated to a level less-than-significant.

CURE Comment #4: CURE comments that the SA/DEIS fails to provide an adequate description of the environmental setting, analysis, and identification of mitigation for these rare plants. CURE also notes that although the SA/DEIS attempts to analyze the impacts and formulate mitigation measures for special-status plants, this analysis may bear little resemblance to the analysis and mitigation that will be required after significant impacts to rare plants are actually identified through an adequate survey effort.

Staff Response: Please see staff's response to CURE comments #1 and #2 regarding establishing floristic baseline conditions. Staff has revised proposed Condition of Certification **BIO-19** which implements a suite of mitigation measures as well as late summer/fall floristic surveys. It also requires that the Applicant implement plant impact avoidance and minimization measures during construction, finalize the draft special-status plant impact avoidance and minimization plan, and incorporate the monitoring of these measures into the Project's Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP, **BIO-7**), among other measures. Also, **BIO-19** includes a step-wise approach to implementation of—and appropriate mitigation for—future findings of rare plants on the Project site. Should future floristic surveys detect previously unknown populations of plants, a framework for comprehensive conservation strategies is already in place for the Applicant, and developed in conjunction with the resource agencies. While it is impossible to accurately predict the late season special-status plants that have potential to occur; staff has undertaken a conservative approach by assuming that late-season special-status plants may occur, and analyzed all the late-season plants documented to occur within a nine-quadrangle area centered on the Project. At least ten additional species were added as a result of consultation with experts in the flora of the region. Staff looked at the full range of possibilities, identified the most likely to occur with input from botanical experts, and prepared triggers and performance standards for mitigation of any unanticipated finds.

CURE Comment #5: CURE comments that the SA/DEIS finds that the Applicant failed to conduct focused spring surveys for golden eagle nest sites or breeding pairs and failed to assess whether the Project site is used by wintering golden eagles. Therefore, the SA/DEIS does not provide an adequate basis for analysis of potential impacts and development of mitigation measures, and cannot make a finding regarding consistency with the Bald and Golden Eagle Protection Act, as required by the Warren-Alquist Act.

Staff Response: Eagle surveys are in progress and results were unavailable at the time of RSA publication. Therefore staff evaluated the potential for the Project to injure or disturb golden eagles with the assumption that an active golden eagle territory might occur within 10 miles of the proposed project; this includes breeding and wintering golden eagles. The recommendation for assessing golden eagle territories with 10 miles of the Project boundaries is based on staff's

USFWS guidance (Pagel et al. 2010). Accordingly, Condition of Certification **BIO-28** was developed to avoid and minimize impacts to golden eagles. Acquisition of compensatory habitat for desert tortoise would mitigate potential cumulative impacts attributable to loss of foraging habitat (**BIO-12**). Staff determined in the RSA that potential direct, indirect, and cumulative impacts to golden eagles would be less than significant with implementation of staff's proposed conditions of certification (i.e., **BIO-12, 14, 20, 22,** and **28**). As described in section C.2.9.2 of the RSA, take (e.g., disturbance) would not occur with implementation of staff's proposed conditions of certification and the Project would therefore be in compliance with the federal Bald and Golden Eagle Protection Act.

CURE Comment #6: CURE comments that the SA/DEIS states that the Applicant's surveys for Couch's spadefoot toads "were not conducted during the proper season (i.e., after summer rains)." Thus, the SA/DEIS requires additional surveys to identify potential spadefoot toad breeding habitat. CURE also comments that the SA/DEIS fails to provide an adequate description of the environmental setting, analysis and identification of mitigation for Couch's spadefoot toad, and that CEQA requires that staff include the analysis outlined in **BIO-27** in the Revised SA, not in a mitigation plan that will be provided by the Applicant after Project approval. Thus, the SA/DEIS failed to provide an adequate analysis and identification of mitigation for Couch's spadefoot toad.

Staff Response: The SA/DEIS text does not, and is not meant to, require surveys at a specific time of year to determine breeding habitat. Potential breeding habitat can be identified throughout the year by identifying areas of possible water impoundment. Breeding habitat has been identified in the Project area, and an impact analysis is included in the SA/DEIS, subsection C.2.4.2. Provisions for further surveys to identify breeding habitat are required pursuant to **BIO-27**, and impact avoidance, minimization, and mitigation measures protect the known breeding site near Wiley Well Road as well as any other breeding sites within the Project site.

CURE Comment #7: CURE comments that although the SA/DEIS attempts to analyze the impacts (and formulate mitigation measures) for the golden eagle, this analysis may bear little resemblance to the analysis (and mitigation) that will be required after significant impacts to golden eagles are actually identified through an adequate survey effort. Hence, the SA/DEIS fails to provide an adequate analysis and identification of mitigation for the golden eagle.

Staff Response: In the RSA, staff evaluated the potential for the Project to injure or disturb golden eagles with the assumption that an active golden eagle territory might occur within 10 miles of the proposed project. Subsequent survey results would not change this analysis and/or mitigation (i.e., **BIO-28**).

CURE Comment #8: CURE comments that SA/DEIS lacks effective, feasible mitigation for numerous impacts it identifies as significant. CURE states that by deferring the development of specific mitigation measures, the SA/DEIS has effectively precluded public input into the "efficacy" or "feasibility" of those measures. Thus, additional mitigation measures must be included in a Revised SA that is circulated to the public and provides a meaningful opportunity for public review and comment.

Staff Response: Consistent with the requirements of CEQA, the conditions of certification presented in the RSA are both effective and feasible. The conditions specifically identified by CURE as deficient are discussed in the following responses to comments.

CURE Comment #9: CURE comments that the following conditions of certification are examples of improper deferral of mitigation that deprive the public of any opportunity to review and submit comments on feasibility: **BIO-7, BIO-10, BIO-13, BIO-14, BIO-15, BIO-16, BIO-18(3), BIO-19, BIO-23, BIO-25, BIO-26**, and **BIO-27**. CURE states, "the SA/DEIS illegally defers identification of each of the above-listed mitigation measures until after certification of the Project. Until the above-listed mitigation measures are identified and evaluated, the Energy Commission lacks substantial evidence to make a finding that each of the mitigation measures listed above will reduce the particular impacts to a less than significant level. The Commission will also not know if it must consider making findings of overriding considerations. Thus, these plans and measures must be developed now, during the environmental review process, and be included in the Revised SA that is circulated for public review and comment."

Staff Response: The conditions of certification identified by CURE require the development of agency-approved final plans prior to construction or operation of the proposed project. The conditions contain well-defined performance standards, and measures within the plans are designed to achieve those performance standards, as required by the respective condition of certification. If the plan's performance standard is achieved, which is required by the conditions of certification, impacts would be less than significant. Finalized plans are not required for the Commission to make its findings pursuant to CEQA and Energy Commission regulations.

CURE Comment #10: CURE comments that **BIO-20** requires the Applicant to acquire compensation lands to mitigate for the direct and indirect impacts to Mojave fringe-toed lizard habitat. However, there is no evidence that qualifying lands exist. The compensation lands must be identified now in order to ensure that significant impacts to Mojave fringe-toed lizards are adequately mitigated.

Staff Response: Staff and other parties (AECOM 2010b) have assessed the availability of privately held mitigation lands within the Chuckwalla Valley that meet the criteria described in **BIO-20** and have determined that sufficient acreage is available to fulfill this mitigation measure. Staff conducted its own independent GIS analysis of potential mitigation lands by overlaying ownership boundaries, parcel data, and the NECO landforms dataset on aerial photo and topographic base maps. Staff concluded that there were ample opportunities for acquiring qualifying lands within the Chuckwalla Valley.

CURE Comment #11: CURE comments that **BIO-19**(3) requires the Applicant to acquire compensation lands to mitigate for potential impacts to four special-status plant species, including Abram's spurge, glandular ditaxis, flat-seeded spurge, and lobed ground cherry without determining whether there is evidence that qualifying lands exist. Thus, CURE states, the mitigation measure may not be "capable of being accomplished in a successful manner....". CURE claims that the compensation lands must be

identified now in order to ensure that significant impacts to special-status plants are adequately mitigated.

> Staff Response: **BIO-19** of the Revised Staff Assessment provides an option for compensatory mitigation through land acquisition or qualifying habitat enhancement/restoration projects. Moreover, avoidance and minimization measures are required for all protected plant occurrences. This is consistent with the CEQA definition of "mitigation" (14 Cal. Code Reg. 15370 of the CEQA Guidelines): avoiding; minimizing; rectifying; reducing or eliminating the impact over time; and compensating by providing replacement or substitute resources or environments. Thus, even if 100 percent of the compensation lands were unavailable, the impact can still be mitigated through enhancement measures on, or adjacent to existing occurrences, on public or private land. The threat of Sahara mustard to the future of special-status plants in Chuckwalla Valley and similar habitats in the region is second only to habitat loss. There are ample opportunities for rehabilitation of degraded or threatened special-status plant occurrences within Chuckwalla Valley and the range of the species, and **BIO-19** includes strict and detailed performance standards for such projects. **BIO-19** also allows for the compensatory mitigation to occur anywhere within the species' range in California, as threats are documented throughout their range. **BIO-19** includes equally specific criteria and reporting and verification requirements for acquisition. **BIO-19** also includes triggers for mitigation of any late-season plants detected during the required summer-fall surveys. Staff conducted an independent assessment of the availability of private lands that contain occurrences or provide important buffer or connectivity lands within the range of the species affected or with the highest potential for occurrence. Staff used a GIS-based web application that allowed staff to view all special-status plant occurrences in the CNDDB dataset and from the California Consortium of Herbaria, overlain on various jurisdictional, biological, landform, utility, USGS topographic maps and aerial imagery for ease of identifying ownership and management opportunities.

CURE Comment #12: CURE comments that **BIO-26** requires the Applicant to implement "remedial action" if the Project causes a decline in spring water tables and a decline in the vigor of groundwater dependent vegetation, but states that the "remedial action" is yet to be defined. CURE claims that the SA/DEIS fails to provide any evidence that any action can be taken to adequately mitigate significant impacts to groundwater dependent vegetation, and concludes that, as written, **BIO-26** is not a feasible mitigation measure.

> Staff Response: Staff defined several remedial actions in the SA/DEIS (see "**Impacts to Groundwater-Dependent Vegetation during Construction and Operation**" pages C.2-100 and C.2-101 of the SA/DEIS). Condition of Certification **BIO-26** has been revised to include remedial measures discussed in the analysis. The Project owner may choose the most feasible method providing it meets the performance standard of restoring the spring water table to baseline levels. The analysis includes a discussion of the importance of the spring water table levels to healthy ecological functioning. Remedial measures must include one of the following measures to meet the performance standard of restoring the

spring groundwater tables to baseline levels: 1) Relocating the Project pumping well to another location farther from the groundwater-dependent vegetation (and where the dependent vegetation is no longer within the drawdown cone of depression), or—alternatively—constructing a new well farther away and reducing water usage in the well closest to the dependent plant communities; 2) Reducing the Project water usage through water conservation methods or new technologies.

Relocating the Project pumping well farther from the affected groundwater-dependent vegetation would address the impact by reducing or eliminating groundwater use in the vicinity of the phreatophytic communities; the influence of the well on groundwater decreases with distance. There is relatively little vegetation of this kind in the valley as it occurs only in areas with a relatively shallow water table (e.g., less than approximately 100 feet in depth). It occurs around the margins of the two dry lake beds. Staff does not expect that the groundwater usage would affect the ironwood forest in Palen Wash, or the ironwood and Palo Verde trees that occur along the many washes leading to the lakebeds; however, staff has insufficient data on which to base such an assumption. Staff therefore recommends that the monitoring of vegetation prescribed under **BIO-25** include a representation of the ironwood and Palo Verde stands in the valley and on Palen Wash, where they occur within the estimated 9 to 10-mile zone of potential effect (at end of operation).

Based on the performance standards for remedial action described above, staff has concluded that with implementation of Conditions of Certification **BIO-25** and **BIO-26**, impacts to groundwater-dependent plant communities would be reduced to less than significant levels.

CURE Comment #13: CURE comments that **BIO-27** attempts to mitigate significant impacts to Couch's spadefoot toad by requiring the Applicant to "create additional breeding habitats" if the breeding pond south of I-10 cannot be avoided. CURE states that there is no evidence that breeding ponds for Couch's spadefoot toad can be created successfully, and states that the measure fails to provide any guidance for the successful creation of breeding habitats for Couch's spadefoot toad. **BIO-27** must be revised to include success criteria. In addition, the Applicant should be required to monitor the created breeding habitats to ensure success. As it stands, **BIO-27** is not a feasible mitigation measure.

Staff Response: Staff believes that creating suitable spadefoot toad breeding habitat is highly feasible because this species readily breeds in ephemeral artificial impoundments such as stock tanks and pools that form at the base of road and railroad grades (Morey 2005). Staff agrees that performance criteria are needed and has added language to **BIO-27** to require monitoring of the created ponds to ensure they hold water for at least 9 days during the spadefoot toad breeding season.

CURE Comment #14: CURE comments that **BIO-8**(#9) requires the Applicant to use "[a] continuous low-pressure technique...for steam blows, to the extent possible, in order to reduce noise levels in sensitive habitat..." **BIO-8**(#9) is vague and uncertain. There is

no evidence that the measure will in fact reduce impacts to biological resources to a less than significant level.

> Staff Response: Staff has revised BIO-8 (#9) to require avoidance of loud construction noises during from February 15 to April 15 if it would result in noise levels over 60 dBA in nesting habitat.

CURE Comment #15: CURE comments that **BIO-19** requires that avoidance and minimization measures be implemented to preserve special-status plant occurrences, including the use of existing roads "wherever possible" and the requirement to "minimize" ground-disturbing activities. These measures are vague and uncertain. There is no evidence that the measures will in fact reduce impacts to biological resources to a less than significant level. The SA/DEIS must therefore be revised to include specific, enforceable mitigation measures. Until then, impacts to special-status plants remain significant.

> Staff Response: Staff has revised **BIO-19** to require the applicant perform late-season botanical surveys for special-status plant species. Staff has also added conditions to **BIO-19** which establish specific, enforceable mitigation including performance standards and a range of options for the applicant to achieve mitigation to less than significant levels. Lastly, the verification of this condition includes the specifics that require the applicant and agencies to commit to carrying out this condition for special-status plant species.

CURE Comment #16 CURE comments that **BIO-21** is also vague and uncertain. The SA/DEIS must define "sufficient duration and intensity" and provide evidence that the surveys will provide an "accurate assessment of bird and wildlife use of the ponds." As it stands, BIO-21 is unenforceable. Thus, impacts to biological resources from evaporation ponds remain significant and unmitigated.

> Staff Response: Condition of Certification **BIO-21** has been revised to define "sufficient duration and intensity" as a minimum of two hours following sunrise (i.e., dawn), a minimum of one hour mid-day (i.e., 1100 to 1300), and a minimum of two hours preceding sunset (i.e., dusk).

CURE Comment #17: CURE comments that **BIO-23** is vague and uncertain. The measure provides no indication as to what "relatively natural condition" means. Thus, the success of the measure is uncertain. There is no certainty that the measure will accomplish the goal of reducing significant impacts to below a level of significance. Further, there is no certainty that the measure can be carried out at all.

> Staff Response: Staff has revised **BIO-23** to require the Decommissioning and Reclamation Plan to be consistent with the provisions set forth in the BLM's 43 C.F.R. section 2805.12 and 3809.500-.599.

CURE Comment #18: CURE comments that **BIO-15** is vague and uncertain. To mitigate for significant impacts to birds from construction noise, the SA/DEIS requires preconstruction surveys for nesting birds. However, the SA/DEIS fails to describe the survey methods to be used. The SA/DEIS should provide information on the specific methods that will be used to conduct the pre-construction nesting bird surveys. The

SA/DEIS should describe how well-concealed or camouflaged nests will be located and not adversely affected by Project activities. In addition, the SA/DEIS should discuss the methods that will be used to minimize surveyor-induced predation, nest disturbance, and abandonment. This information is crucial to evaluating whether the proposed mitigation will reduce noise impacts to a less than significant level. Because the SA/DEIS fails to include this information, the proposed mitigation is uncertain, and impacts to biological resources from Project noise remain significant.

> Staff Response: Staff has revised **BIO-15** to address CURE's concerns. The condition now specifies that the Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors familiar with standard nest-locating techniques such as those described in Martin and Guepel (1993), and that surveyors performing nest surveys shall not concurrently be conducting desert tortoise surveys. It also requires establishment of non-disturbance nest buffers that incorporate species-specific alert distances and flush initiation distances.

CURE Comment #19: CURE comments that Condition **BIO-18** of the SA/DEIS is vague and uncertain. Staff needs to clarify the extent to which the Applicant will be required to conform to CBOC guidelines. If the Applicant will not be held responsible for conducting all four phases called for in the CBOC guidelines, the SA/DEIS should specify the survey techniques expected of the Applicant, including the time of day surveys will be permitted.

> Staff Response: Staff has revised **BIO-18** to address CURE's concerns. The condition now requires that monitor conduct pre-construction surveys for burrowing owls no more than 30 days prior to initiation of construction activities. Surveys shall be focused exclusively on detecting burrowing owls, and shall be conducted from two hours before sunset to one hour after or from one hour before to two hours after sunrise.

CURE Comment #20: CURE comments that the ability to effectively survey for multiple species concurrently depends on the habits of the target species. The SA/DEIS should not assume that surveys for multiple species can effectively be conducted concurrently. Instead, the SA/DEIS must demonstrate that such surveys can be done concurrently, or the SA/DEIS must require that such surveys be conducted independently.

> Staff Response: Staff has proposed individual conditions of certification for the following: desert tortoise, nesting birds, American badger and desert kit fox, burrowing owl, special-status plant species, and Couch's spadefoot toad. Each of the individual conditions of certification specify independent pre-construction surveys either following the agency recommended protocol for that species or has specified methods and parameter to be followed during surveys, if a formal survey protocol does not exist. Staff has revised the impact discussion for desert kit fox and American badger to state that pre-construction surveys performed concurrently for these ground-dwelling species would effectively identify the presence of each species. **BIO-15** and **BIO-18** have been revised to address CURE's concerns.

CURE Comment #21: CURE comments that the SA/DEIS' preconstruction survey requirement entails a Burrowing Owl Mitigation Plan if owls are detected within the Project area. Owls were detected during the Applicant's 2007 and 2009 surveys. CBOC guidelines call for mitigation for burrows occupied within the past three years. As a result, the SA/DEIS must require the Burrowing Owl Mitigation Plan to be prepared prior to construction for public review and comment.

> Staff Response: Preparation of the Burrowing Owl Mitigation Plan requires site-specific, current information based on the results of surveys conducted immediately before construction, and therefore a plan cannot be prepared now and circulated for public review and comment. Staff's Condition of Certification **BIO-18** requires that the applicant prepare and submit for agency review and comment a Burrowing Owl Mitigation Plan prior to construction.This condition provides sufficient guidance so that all parties can understand the triggers for mitigation and the types and effectiveness of measures that will be implemented.

CURE Comment #22: CURE comments that the burrowing owl mitigation guidelines issued by CDFG recommend that the project sponsor provide funding for long-term management and monitoring of the protected lands. The monitoring plan should include success criteria, remedial measures, and an annual report to CDFG. The SA/DEIS must be revised to incorporate these guidelines into the conditions of certification.

> Staff Response: **BIO-18** already requires long term management and monitoring of the 39 acres of compensatory mitigation land. In addition, staff has revised **BIO-18** to require five years of monitoring and management at the relocation area.

DEFENDERS OF WILDLIFE (DOW) LETTER DATED DECEMBER 23, 2009:

DOW Comment #1: DOW comments that the draft Environmental Impact Statement (DEIS) must include alternative project sites or locations, including those that may not fall under the jurisdiction of the BLM; project extent and electrical power generation that differ from the applicant's proposal; and the potential for different technology that may lead to lesser potential impacts on sensitive environmental resources. DOW comments that among the reasonable alternatives that should be analyzed is reduction in project size. They recommend the project exclude essentially all dune habitat and create a buffer zone of approximately 0.5 mile. This would protect the Mojave Fringe-toed Lizard, a BLM Sensitive species, and its habitat within the proposed project area.

> Staff Response: Staff assessed several alternative sites and alternative configurations (including a reduced size alternative) to evaluate the impacts of those alternatives to biological resources in subsections C.2.5 through C.2.7. The **Alternatives** section of this report provides a detailed discussion of alternatives, including alternatives technologies. Since issuance of the SA/DEIS, the Applicant has initiated several project changes, including removing 41.4 acres of sand dune habitat from the easternmost portion of the Project footprint, reducing direct impacts to Mojave fringe-toed lizards and avoiding interference with the regional sand transport corridor. See subsection C.2.4.2 for further discussion.

DOW Comment #2: DOW comments that the Application for Certification (AFC) for the Genesis Solar Power Project submitted by the project proponent provides adequate detail of the species of plants, animals and their habitats that would be affected by the project, but they do not support the applicant's conclusions that the impacts would be rendered less than significant due to implementation of various mitigation and avoidance measures suggested by the applicant.

> Staff Response: Staff believes that sufficient information was available with the AFC and subsequent Data Responses from the Applicant to arrive at conclusions about the significance of Project impacts to biological resources, and to develop mitigation measures that would reduce impacts to less than significant levels. These mitigation measures were developed in coordination with the resource agencies.

DOW Comment #3: The applicant has provided no avoidance measures to eliminate or reduce loss of habitat that supports Special Status Species, especially habitat for the Burrowing Owl and Mojave Fringe-toed Lizard. Capture and release of certain species that would be affected by the proposed project does not constitute avoidance or mitigation; rather, we consider these suggested actions as salvage operations.

> Staff Response: Staff has provided species-specific avoidance, minimization and compensation measures for all of the special-status species that could occur in the Project area in conditions of certification. Staff agrees that capture and release of any species is a salvage measure carried out with the intention of avoiding direct construction impacts, and is a complement to other, higher-priority mitigation measures. Other efforts, such as Worker environmental training awareness (**BIO-6**), and Biological Resources Mitigation Implementation and Monitoring Plan (**BIO-7**), provide further, comprehensive measures designed to minimize Project effects upon Special Status Species. In addition, the Applicant has modified their Project footprint to eliminate 41.1 acres of their solar field which was intruding into a sand transport corridor, which reduced the impacts to Mojave fringe-toed lizards.
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> **DOW Comment #4:** DOW comments that permanent loss of approximately 2,000 acres of intact wildlife habitat and its associated species are significant and the proposed mitigation and avoidance measures contained in the applicant's AFC will not reduce the habitat loss.
>
> Staff Response: Staff agrees that this habitat loss is significant for resident and migratory wildlife and has required compensation for these losses in Condition of Certification **BIO-12, BIO-20 and BIO-22.**

DOW Comment #5: DOW comment that the impacts from the proposed and other similar projects within the Chuckwalla Valley on designated WHMAs and their associated species need to be carefully analyzed. The long-term viability and management effectiveness of the WHMAs needs to be carefully analyzed.

Staff Response: Subsection C.2.4.2 and C.2.8 provide a detailed analysis of direct, indirect and cumulative impacts to plants, wildlife and habitats within the Chuckwalla Valley on designated WHMAs.

DOW Comment #6: DOW comment that the effect of the project on species movements within the area should be thoroughly examined, especially those of the Desert Tortoise, Mojave Fringe-toed Lizard, Mule Deer and Desert Bighorn. Based on the relatively remote location of the proposed project and its location across the middle of the outflow from Palen Wash, the analysis of impacts to species movements through the region should be carefully analyzed.

Staff Response: Subsections C.2.4.2 and C.2.8 provided a thorough analysis of Project impacts to desert tortoise, Mohave fringe-toed lizard, mule deer and desert bighorn sheep, and also considered impacts to species movements in this analysis.

DOW Comment #7: DOW comment that the impact of the project on deposition and maintenance of sand in dune and playa areas needs to be addressed especially since this medium supports significant numbers of Mojave Fringe-toed Lizards. Proposed drainage modification for control of precipitation runoff could have significant, long-term adverse impacts on the maintenance of dune habitats in the project area.

Staff Response: Staff has analyzed the direct and indirect impacts of the proposed project on the sand dune transport system in subsections C.2.4/2 and C.2.8. Additionally, in response to agency and public feedback, further Project refinements have been made, eliminating impacts to approximately 41.4 acres of stabilized and partially stabilized sand dune habitat located in a regional sand movement corridor, and to Sonoran creosote scrub habitat, and desert washes.

DOW Comment #8: DOW comment that the required mitigation for loss of dune and desert ephemeral wash habitats as per the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) Amendment to the CDCA Plan should be identified. It appears that loss of these habitats requires a project proponent to compensate at a ratio of 3 acres for every acre lost. The DEIS should also evaluate opportunities for such habitat compensation within the planning area and determine if any required habitat loss compensation opportunity exists.

Staff Response: Staff has required mitigation for impacts to sand dune habitat at a 3:1 ratio, as specified in NECO.

DOW Comment #9: DOW comments that the effects of water table drawdown on shallow aquifers including the Ford Dry Lake playa, Palen Dry Lake playa, and McCoy Spring need to be carefully analyzed. The effect of diversion of water from ephemeral streams on sand transport and deposition, vegetation communities and dependent wildlife should be analyzed.

Staff Response: Staff assessed the impact of the project to groundwater dependent vegetation and also evaluated the effects of water diversion on ephemeral streams and sand transport in subsection C.2.4.2.

DOW Comment #10: DOW comments that the cumulative impacts to species and their habitats in the Chuckwalla Valley region need to be analyzed. Trends in species populations and extent of habitats that BLM considers at-risk will be an important aspect of this analysis.

> Staff Response: Subsection C.2.8 provides a thorough and quantitative analysis of cumulative impacts to habitat and sensitive species in the Chuckwalla Valley region.

DOW Comment #11: The DEIS must address the projected effects of global climate change on plants, animals and their habitats throughout the Chuckwalla Valley as part of the future environmental baseline. The future baseline condition should account for the existing impacts to species adaptation opportunities such as habitat lost and fragmented by highways, canals, fences and general development.

> Staff Response: Subsection C.2.4.2 discusses the impacts of the project on listed species and other sensitive resources, and incorporates an assessment of climate change in this analysis. The cumulative impact analysis in subsection C.2.8 also considered the effects of climate change in their analysis.

Kenneth Waxlax Letter Dated May 7, 2010

Waxlax Comment #1: The commenter states that he is participating in a market study for the Coachella Valley Conservation Commission and that this study will be valuable in providing local parcel values for mitigation lands. Therefore, local land values should be used to accurately determine the appropriate mitigation costs for acquisition of mitigation lands.

> Staff Response: Staff agrees that local land values should be used to accurately determine the appropriate costs for acquisition of mitigation lands, and is aware of the uncertainty associated with any estimate of future land acquisition costs. Staff is currently undertaking a more detailed analysis of anticipated land acquisition cost that would help refine the security estimates provided in the conditions of certification.

Waxlax Comment #2: The commenter states that the $500 per acre estimate for acquisition of lands in the Chuckwalla Bench area may be accurate. However, the commenter does not believe it is accurate for all lands that might be acquired within the Colorado Desert Recovery Unit for all proposed solar projects in the region. In addition, based on previous sale rates at $500/acre, it could potentially require several years to locate willing sellers at that price to acquire the needed mitigation acreage for solar projects in the region.

> Staff Response: Staff agrees that the $500/acre estimate may not reflect an accurate estimate for future land costs of suitable compensatory mitigation parcels within the Colorado Desert Recovery Unit. Staff is currently undertaking a more detailed analysis of anticipated land acquisition costs that would help refine the security estimates provided in the conditions of certification.

Waxlax Comment #3: The commenter states that proposed Condition of Certification **BIO-12** should be reworded to include language that summarizes all costs of land acquisition such as included in **BIO-22** and that clearly states that costs are subject to change based on market conditions.

> Staff Response: Staff agrees and has made the suggested revision in proposed Condition of Certification **BIO-12**.

Waxlax Comment #4: The commenter states that the land values from the previously mentioned market survey should be used in the mitigation land acquisition calculations to more accurately estimate land acquisition costs. The commenter also states that there may be economies of scale for restoration and management of mitigation lands that may reduce the cost per acre below the $1,450 per acre estimate.

> Staff Response: Staff is analyzing the factors that may affect estimates of acquisition and management costs, including the referenced market survey, and agrees with the commenter that there are economies of scale to be achieved with large-scale restoration and management efforts.

Waxlax Comment #5: The commenter states that limiting acquisition of desert tortoise compensation lands to the Colorado Desert Recovery Unit precludes the potential to acquire lands in the Joshua Tree DWMA or lands on the western edge of NECO that may be critical to provide habitat for conservation of desert tortoise in the face of climate change.

> Staff Response: The area referenced by the respondent largely pertains to the geographical area along the southern Little San Bernardino Mountains in the southeastern portion of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) area. This area is dominated by mountainous terrain that is largely intact without human obstructions to tortoise movement; there also is little threat of development due to absence of infrastructure and steep slopes. Mitigation parcels are typically prioritized by two criteria--biological value and degree of threat. The areas described by the commenter ranks low on both priority scales--steep topography, and therefore lower tortoise densities, with little threat from development. Land acquisition in this area would block up public land ownership where a BLM checkerboard pattern currently exists but would do little to offset impacts to desert tortoise connectivity.
>
> The areas identified in the RSA as potentially suitable acquisition lands for desert tortoise compensatory mitigation (see Appendix B) better meet the criteria described above than the Coachella Valley-focused parcels mentioned by the commenter. Furthermore, acquiring mitigation lands in the area where the CVMSHCP plan and NECO overlap is problematic. Those parcels may be construed by some parties as counting towards the CVMSHCP rough-step formula, which functions as a governor to the pace of development. The formula prevents development from out-pacing conservation by more than 10 percent at any given point in time. Thus, as more conservation occurs (mitigation for solar projects), more development can occur as well. Therefore the acquisition of solar mitigation parcels in the CVMSHCP plan area may be interpreted by some

parties would as allowing Riverside County to approve more development on other private lands along the I-10 corridor that staff and the resource agencies are interested in protecting. However, since the CVMSHCP sets a cap on new development (approximately 90 percent of private lands will be conserved, 10 percent can be developed), the solar mitigation would only increase the rate of development, not the amount that could be lost in the future. With respect to climate change and the suitability of the areas targeted for compensatory mitigation for the Genesis Project, staff believes that these lands would facilitate desert tortoise movement in a future warmer climate scenario. On the west end, from Cactus City to Chiriaco Summit, desert tortoise movement upslope into Joshua Tree National Park would be facilitated with protection of the proposed lands. On the east end between the Chuckwalla and Palen mountains, desert tortoise movement up from the valley floor to the alluvial fans would be facilitated in both directions. Long-term latitudinal movements to the north would be facilitated at either end and in between.

Environmental Protection Agency Letter Dated December 11, 2009

EPA Comment #1: The EPA requested that the DEIS identify all petitioned and listed threatened and endangered species and critical habitat that might occur within the Project area, and identify and quantify potential direct, indirect, and cumulative impacts to these resources. The EPA also recommended that the DEIS describe the condition of the land selected for the proposed project and disclose whether this land is classified as disturbed or impaired, identify measures to avoid and minimize habitat loss and fragmentation, discuss impacts of fence construction, effects of shade on vegetation, and effects of evaporation ponds on birds and other wildlife.

Staff Response: Staff has addressed all direct and indirect impacts associated with impacts to listed species (desert tortoise) and its critical habitat, and has also discussed impacts to other special concern species, in subsection C.2.4.2. The SA/DEIS also discussed the baseline condition of habitat and biological resources within the proposed Project area in subsection C.2.1. Subsection C.2.4.12 provides detailed conditions of certification that includes avoidance, minimization and compensation measures for habitat loss and fragmentation, impacts of fence construction, and evaporation ponds. The effect of shade is not addressed because this impact is not relevant to the kind of solar development proposed for this project.

EPA Comment #2: The EPA comments that it should be explained whether any ponded water associated with the project has the potential to attract wildlife, particularly migratory waterfowl. If there is potential for exposure of wildlife to contaminant in these waters then the EPA recommends identifying mitigation measures to avoid such impacts.

Staff Response: The proposed Project includes evaporation ponds, which staff considered a potential threat to waterfowl and other wildlife due to risk from toxic levels of selenium and other elements as well as hypersalinity. Staff's proposed Condition of Certification **BIO-21** requires the ponds to be netted to exclude birds and other wildlife and also requires a rigorous wildlife monitoring program.

EPA Comment #3: The EPA recommended that the SA/DEIS include an invasive plant management plant to monitor and control noxious weeds.

> Staff Response: Staff's proposed Condition of Certification **BIO-14** provides guidance for preparation and implementation of a Weed Management Plan to monitor and control noxious weeds.

EPA Comment #4: The EPA recommends that the DEIS identify whether the proposed project is located within one of the solar energy study areas of in close proximity to one, and that staff consider the cumulative impacts associated with multiple large-scale solar projects proposed in the region and the potential impacts to endangered species and habitat.

> Staff Response: Subsection C.2.8 provides a detailed and quantitative cumulative impact analysis for sensitive species and their habitat within the NECO planning area and the Chuckwalla Valley.

EPA Comment #5: The EPA recommends that BLM consider adopting a formal adaptive management plan to evaluate and monitor impacted resources.

> Staff Response: Many of staff's proposed conditions of certification include adaptive management components, including **BIO-13** (Raven Management Plan), **BIO-15** (Avian Protection Plan), **BIO-16** (Pre-Construction Nest Surveys), **BIO-19** (Special Status Plant Impact Avoidance and Minimization), **BIO-24** (Golden Eagle Inventory and Monitoring), and **BIO-21** (Evaporation Pond Netting and Monitoring). **BIO-25** includes a detailed plan for monitoring groundwater-dependent vegetation within 10 miles of the Project pumping well, and triggers for implementation of remedial action. **BIO-25** describes the remedial action and the performance standard for success of the mitigation.

EPA Comment #5: The EPA recommends that the DEIS consider how climate change could potentially affect the proposed project, specifically within sensitive areas, and assess how the projected impacts could be exacerbated by climate change. The EPA also suggests that staff consider climate change in the cumulative impact analysis.

> Staff Response Subsection C.2.4.2 discusses the impacts of the project on listed species and other sensitive resources, and incorporates an assessment of climate change in this analysis. The cumulative impact analysis in subsection C.2.8 also considered the effects of climate change in their analysis.:

Western Watersheds Project (WWP) Letter Dated December 23, 2009

WWP Comment #1: WWP comments that the NEPA/CEQA documents must describe, clearly characterize and identify the desert tortoise population that will be impacted by each alternative if the agencies are to take NEPA's requisite "hard look" at the environmental effects.

> Staff Response: Subsection C.2.4.1 provides an assessment of the resident desert tortoise population on the proposed Project site. This assessment is inclusive of current literature and resource agency input. Using this information

staff has provided a detailed analysis of impacts of direct, indirect and cumulative impacts to desert tortoise in subsections C.2.4.2 and C.2.8.

WWP Comment #2: The Project Applicant describes the project sites as having no tortoise present although 2 carcasses were found in the zone-of-influence. Additional surveys should be conducted to confirm this. The EIS should also consider the status of the tortoises in the affected recovery unit.

Staff Response: Staff does not agree with the Applicant's characterization of the of desert tortoise habitat at the Project site. Subsection C.2.8 provides a detailed and quantitative analysis of impacts of the Project to desert tortoise with the assumption that the site could provide habitat for desert tortoise, and also addressed the impact of the project in the affected recovery unit.

WWP Comment #3: WWP comments that both the Ford Dry Lake project would disrupt connectivity between the Eastern Colorado Recovery Unit and the Northern Colorado Recovery Unit. This could reduce gene flow and impair desert tortoise recovery.

Staff Response: Staff addressed this potential impact in subsections C.2.4.2 and C.2.8, and agrees that connectivity could be affected by the Project. Staff has developed mitigation for this impact in proposed Condition of Certification **BIO-12**.

WWP Comment #4: WWP comments that the proposed evaporation ponds could lead to increased numbers of predatory ravens, coyotes, and other subsidized predators in the area. This could impair recovery in the adjacent Chuckwalla DWMA.

Staff Response: Staff agrees that the Project's evaporation ponds could attract ravens and other subsidized predators, and has proposed Condition of Certification **BIO-21** which requires the ponds to be netted to exclude ravens and other wildlife.

WWP Comment #5: WWP comments that desert tortoises could also be indirectly impacted by this project if OHV riders displaced from the Ford Dry Lake recreation area move to areas with higher desert tortoise values.

Staff Response: Ford Dry Lake and Dunes were formerly designated for OHV recreation, but now are closed to vehicles; therefore staff does not anticipate a significant increase in OHV use elsewhere in desert tortoise habitat as a result of the proposed Project.

WWP Comment #6: WWP comments that the NEPA/CEQA documents should provide a review of the direct, indirect and cumulative impacts of the proposed project on the tortoise of the Eastern Colorado and Northern Colorado Recovery Units, and all associated infrastructure including the roads and transmission lines.

Staff Response: Staff provides a review of the potential direct, indirect and cumulative impacts of the Proposed project on desert tortoise in subsections

C.2.4.2 and C.2.8, and provided mitigation for this impact in proposed Condition of Certification **BIO-12**.

WWP Comment #7: WWP comments that the project is located south of the Palen Mountains and south and west of the McCoy mountains and could provide connectivity for bighorn sheep moving between them. The NEPA/CEQA documents should review all direct, indirect and cumulative impacts to this species including impacts to linkage habitat and connectivity issues.

Staff Response: Staff provided an analysis of impacts of this and other nearby Projects to bighorn sheep connectivity, and addressed direct, indirect and cumulative impacts, in subsections C.2.4.2 and C.2.8.

WWP Comment #8: WWP comments that the EIS should carefully consider and analyze impacts to all State protected species such as burrowing owl, sensitive species, rare plants and Unusual Plant Assemblages (UPA) that would be affected by the project. It should provide detailed vegetation and wildlife maps to facilitate public input into the process.

Staff Response: Staff analyzed the impacts of the Project to burrowing owl, sensitive species, rare plants and sensitive plant communities in subsections C.2.4.2 and C.2.8, and provided avoidance, minimization and compensation measures for these impacts in the proposed conditions of certification. Detailed maps and figures on vegetation and wildlife records in and near the Project are available on the Energy Commission web page for this Project < <www.energy.ca.gov/sitingcases/genesis_solar/index> Public input has been solicited and addressed through noticed meetings, electronic mail listservers, and included descriptions of baseline conditions at the site.

WWP Comment #9: WWP comments that invasive plants and weeds are threats to native habitat, rare plants, and sensitive species. They pose an immense fire hazard. Using chemicals to kill weeds requires exposing the environment, species, and watershed area to a toxic substance which can be the source of further damage to environmental and human health. Manual weed control requires much human effort, machinery, and can cause even more disturbance, leading to erosion, disturbance, and, in some cases, more weeds. The EIS should carefully consider how invasive plants and weeds will be managed and controlled.

Staff Response: Staff's proposed Condition of Certification **BIO-14** provides guidance for preparation and implementation of a Weed Management Plan to monitor and control noxious weeds.

WWP Comment #10: WWP comments that desert washes, drainage systems, and washlets are very important habitats for plants and animals in arid lands. The wash habitat impacted by each alternative should be evaluated and appropriate mitigations made for stream bed alterations. WWP comments that soil erosion on low fill slopes and steeply graded areas could result in sedimentation of water bodies. Changes in hydrology and soil movements may impact rare plants and habitats for sensitive species, and may impact burrowing species such as the desert tortoise.

Staff Response: Staff addressed direct, indirect and cumulative impacts to desert washes and other waters of the state in subsections C.2.4.2 and C.2.8. This analysis also considered the effects of soil erosion, sedimentation and off-site impacts of these alterations. Staff provided mitigation for these impacts in proposed conditions of certification **BIO-19** and **BIO-22**. Project alternatives focused on minimizing impacts to desert washes were considered in subsections C.2.5 through C.2.7.

WWP Comment #11: WWP comments that the EIS must considered the cumulative effects of this project in combination with all the other consumptive uses that are occurring on these public lands including livestock grazing, off road vehicle activity, and mining. New transmission line projects have the potential to open up more lands to energy (or other) development, placing wide swaths of habitat at risk, and greatly increase degradation and fragmentation of habitats and important wild land areas and have lasting and damaging impacts.

Staff Response: Subsection C.2.8 provides a detailed and quantitative cumulative impact analysis for sensitive species and their habitat within the NECO planning area and the Chuckwalla Valley.

WWP Comment #12: WWP comments that the NEPA/CEQA documents must explain the monitoring programs that will be in place to monitor the short and long term impacts of the project. This should include the timelines, and estimated costs and sources of funding for the monitoring programs.

Staff Response: Many of staff's proposed conditions of certification include a monitoring components, including **BIO-7**, (Biological Resources Mitigation Implementation and Monitoring Plan), **BIO-8**, (Impact Avoidance and Minimization Measures), **BIO-9** (Desert Tortoise Clearance Surveys and Fencing), **BIO-10** (Desert Tortoise Translocation Plan), **BIO-13** (Raven Management Plan), **BIO-15** (Avian Protection Plan), **BIO-16** (Pre-Construction Nest Surveys), **BIO-19** (Special Status Plant Impact Avoidance and Minimization), **BIO-28** (Golden Eagle Inventory and Monitoring), and **BIO-21** (Evaporation Pond Netting and Monitoring). **BIO-25** includes a detailed plan for monitoring groundwater-dependent vegetation within 10 miles of the Project pumping well, and triggers for implementation of remedial action. **BIO-25** describes the remedial action and the performance standard for success of the mitigation.

WWP Comment #13: WWP comments that the EIS should describe the restoration and rehabilitation activities that will be required for habitat disturbed during construction.

Staff Response: Staff's proposed Condition of Certification **BIO-8 (**Impact Avoidance and Minimization Measures) requires preparation and implementation of a Revegetation Plan to restore all areas subject to temporary disturbance to pre-Project grade and conditions.

Center for Biological Diversity (CBD), letter dated December 23, 2009

CBD Comment #1: CBD comments that thorough, seasonal surveys should be performed for all plant and wildlife species and that the proper resource agencies should be consulted for the proper methods. Also, full disclosure of the methods and

results should be made available for public review to satisfy the requirements of NEPA and CEQA. CBD comments all plant and wildlife surveys should be performed following the applicable, agency-approved and recommended survey protocol. Additionally, all new rare species found during surveys must be reported to the California Natural Diversity Database (CNDDB).

> Staff Response: The Applicant conducted field surveys at the Genesis Project site following the applicable agency survey guidelines and survey protocols. Results of plant and wildlife surveys were made available for public review through several published means including the applicant's Application for Certification and Data Responses which are published and available on the Energy Commission's website. Survey methods and results for the Genesis Project were also discussed during several public meetings and workshops. Field surveys performed during 2009 and 2010 were performed following the most current survey guidelines and protocols provided by the California Department of Fish and Game, U.S. Fish and Wildlife Service, and the California Native Plant Society. The applicant provided CNDDB forms for new species occurrences in the Application for Certification and/or Data Request Responses.

CBD Comment #2: CBD comments that vegetation mapping should be provided on a map at a large enough scale to provide an accurate mapping and account of project impacts to vegetation and wetland communities.

> Staff Response: The applicant's assessment of the Project's impacts to vegetation communities and state waters was performed at an appropriate scale mapping unit. The majority of the impact assessment was performed in GIS which uses shapefiles and electronic data with the project/site plan overlaid that allows for an accurate assessment of impact acreages.

CBD Comment #3: CBD comments the EIS/SA must evaluate all direct, indirect, and cumulative impacts to sensitive habitats, including impacts associated with the establishment of unpermitted recreational activities, the introduction of non-native plants, the introduction of lighting, noise, and the loss and disruption of essential habitat due to edge effect.

> Staff Response: Staff has provided a detailed analysis of impacts of direct, indirect and cumulative impacts to all sensitive biological resources, including those mentioned by CBD, in subsections C.2.4.2 and C.2.8. Staff conducted a detailed and quantitative cumulative effects analysis for biological resources affected by the project using GIS-based datasets for vegetation, landforms, soils, watersheds, CNDDB occurrences, and the USGS desert tortoise habitat model. The cumulative effects analysis also carefully considered cumulative indirect effects that are more difficult to quantify in a GIS-based analysis of habitat loss.

CBD Comment #4: CBD comments that several plant and wildlife species were identified by the applicant as either occurring or having a high potential to occur within the Genesis site and that the SA/EIS must address the impacts and propose effective ways to avoid, minimize, and mitigate the impacts to these resources including as assessment of on-site and off-site alternatives that would avoid or minimize impacts.

Staff Response: All of the plant and wildlife species identified by the applicant were addressed in the RSA including their potential for occurrence in the Project area. Staff considered all sensitive habitats in the analysis, including plant communities identified by CNDDB as rare (CDFG 2003). The analysis of effects included the indirect effects of increased vehicle use, introduction and spread of non-native plants, fragmentation and other edge effects, and lighting and noise

CBD Comment #5: CBD requests that staff look at ways to avoid impacts to desert tortoise by analyzing alternative sites and other measures, and recommends 5:1 mitigation for impacts to desert tortoise habitat. They also note that translocation does not have a proven track record of success, and specifies measures that must be taken for any translocation effort. CBD also comments that an aggressive raven predation plan is needed during project development and implementation.

Staff Response: Staff assessed several alternative sites and alternative configurations to evaluate the impacts of those alternatives to desert tortoise and other sensitive resources in subsections C.2.5 through C.2.7. Staff has proposed mitigation at a 1:1 ratio for desert tortoise in Condition of Certification **BIO-12**, and has also proposed development of a detailed Desert Tortoise Translocation Plan (**BIO10**) and a Raven Management Plan (**BIO-13**).

CBD Comment #6: CBD suggests that if burrowing owls are observed during field surveys, alternatives should be analyzed that consider moving the project away from active burrows, and recommended that mitigation lands be acquired for burrowing owl and managed in perpetuity at a ratio of 5:1.

Staff Response: Staff analyzed the potential impacts to burrowing owls from construction and operation of the project in subsection C.2.4.2, and staff's proposed Condition of Certification **BIO-18** recommends avoidance, minimization and compensation measures for burrowing owls in accordance with CDFG (1995) recommendations. Currently, no burrowing owl burrows have been detected within the Project Disturbance area.

CBD Comment #7: CBD comments the acquisition of lands to be managed in perpetuity for conservation must be included as part of the strategy to avoid, minimize and mitigate impacts to the other species found on the Genesis site as well. Acquisition is particularly important for the rare and sensitive species in the Project area because the Genesis Project appears to have no compatibility with any type of on-site conservation of plant communities or wildlife.

Staff Response: As discussed in subsection C.2.4.2, staff considers in-perpetuity protection of acquired compensation lands as a crucial element of compensatory mitigation.

CBD Comment #8: CBD states avoidance is the preferred method of mitigation for impacts to rare plants. If translocation is to be analyzed as a feasible means of minimizing rare plant impacts, a plan must be developed that identifies methods for transplanting, success criteria, and criteria for selecting lands for rare plant translocation,

Staff Response: Staff has required in Condition of Certification **BIO-19** that special-status plants that cannot be feasibly avoided be mitigated through acquisition and protection of off-site occurrences (or buffer lands surrounding the occurrence) that are vulnerable to development. Staff also included, as an option, detailed performance standards and guidelines for mitigation through restoration of occurrences degraded by invasive plants, ORV, grazing, or altered hydrologic or geomorphic processes. Staff specified in **BIO-19** that transplantation, or translocation, is not an acceptable method of mitigation based on previously demonstrated, overall high rates of failure.

CBD Comment #9: CBD comments that the EIS/SA evaluated the impact of the proposed permitted activities on locally rare species and not merely federal- and state-listed threatened and endangered species.

Staff Response: Staff directed the Applicant to provide survey data for CNPS List 3 and 4 plant species and communities recognized as rare by the CNDDB (CDFG 2003), such as the galleta grass-dominant communities, even where not regulated by other LORS. These resources were analyzed and, where necessary to address significant impacts, mitigation measures were prescribed.

CBD Comment #10: CBD comments that the EIS/SA must identify and evaluate impacts to species and ecosystems from invasive exotics species. CBD comments that factors such as degradation of plant communities by invasive exotics, displacement of native vegetation by invasive landscape species, degradation of functioning ecosystems present in the project area must be evaluated in the EIS/SAs.

Staff Response: Staff has provided a detailed analysis of the impacts to ecosystems and sensitive species from invasive exotic species. To avoid and minimize such impacts, staff has proposed implementation of Condition of Certification **BIO-14**, the Weed Management Plan, to prevent any Project-related increases in weeds.

CBD Comment #11: CBD comments that he EIS/SA must evaluate all direct, indirect, and cumulative impacts to wildlife movement corridors including an analysis of movement of large mammals, as well as other taxonomic groups, including small mammals, birds, reptiles, amphibians, invertebrates, and vegetation communities. The EIS/SA should evaluate habitat suitability within the analysis window for multiple species, including all listed and sensitive species and should also consider how wildlife movement will be affected by other planned approved, planned, and proposed development in the region as part of the cumulative impacts. CBD also comments that the analysis should analyze whether any proposed wildlife movement corridors are wide enough to minimize edge effects and allow natural processes of disturbance and subsequent recruitment to function. The EIS/SAs should also evaluate whether the proposed wildlife movement corridors would provide key resources

Staff Response: Staff provided an analysis of direct, indirect and cumulative impacts to wildlife movement corridors in subsections C.2.4.2 and C.2.8.

CBD Comment #12*:* Because of the number of projects that are proposed in the projects' vicinity and the region, a thorough analysis of the cumulative impacts from all of these projects on the resources needs to be included.

> Staff Response: A detailed and quantitative cumulative effects analysis has been provided in subsection C.2.8.

California/Nevada Regional Conservation Committee (CNRCC) Desert Committee Letter Dated December 23, 2009

CNRCC Desert Committee Comment #1: CNRCC Desert Committee comments that the DEIS must provide feasible project alternatives that would avoid significant impacts, particularly significant impacts to biological and cultural resources

> Staff Response: Staff assessed several alternative sites and alternative configurations to evaluate the impacts of those alternatives to desert tortoise and other sensitive resources in subsections C.2.5 through C.2.7.

CNRCC Desert Committee Comment #2: CNRCC Desert Committee comments that the FSA/DEIS must address risks associated with global climate change in the broader context. This includes both the need for climate change mitigation strategies and the need for climate change adaptation strategies; especially conserving intact swathes of habitat and the landscape level corridors needed to connect them.

> Staff Response: Staff considered the risks to biological resources associated with global climate change and, in consultation with BLM, USFWS, and CDFG, has identified a critical corridor for wildlife movement and connectivity between the lower elevations of the Chuckwalla DWMA and Critical Habitat Unit, and the higher elevations north of I-10. The areas are identified as priorities for both acquisition and future solar exclusion; a detailed description of the strategy is included as Appendix B to the Biological Resources RSA.

CNRCC Desert Committee Comment #3: CNRCC Desert Committee comments that the FSA/DEIS must undertake a rigorous analysis to determine which portion of the application, if any, is appropriate for the proposed exclusive industrial use of public lands to the exclusion of all other uses. Then, for any portion deemed suitable for such use, there must be full and feasible mitigation specific to each identified impact.

> Staff Response: Staff undertook a rigorous independent analysis of the direct, indirect, and cumulative effects of the Project and has developed detailed mitigation measures with performance standards, monitoring and reporting requirements for the Applicant to follow. Monitoring and enforcement by the Energy Commission will extend for the life of the Project for many measures.

CNRCC Desert Committee Comment #4: CNRCC Desert Committee comments that the FSA/DEIS must identify and analyze the importance of alluvial fan habitat to multiple species and the effect of the structural loss of habitat on this alluvial fan/bajada on the remaining habitat in the area. After requiring avoidance to the maximum extent feasible, the DEIS must demonstrate that proposed mitigation actually provides for compensatory mitigation for each species of rare or sensitive plant and animal including listed species,

as well as, kit fox, burrowing owl, nesting bird species, badger, and Nelson bighorn sheep as well as each sensitive habitat type.

> Staff Response: Staff has addressed all direct and indirect impacts associated with impacts to listed species and other special concern species, in subsection C.2.4.2. Subsection C.2.4.12 provides detailed conditions of certification that includes avoidance, minimization and compensation measures for the sensitive resources identified by CNRCC.

CNRCC Desert Committee Comment #5: CNRCC Desert Committee comments that the FSA/DEIS needs to adequately identify and analyze both the cumulative impacts and the growth inducing impacts, which in these cases are closely tied together.

> Staff Response: Staff addressed cumulative impacts to biological resources in subsection C.2.8, but has not integrated this analysis with an assessment of growth-inducing impacts.

CNRCC Desert Committee Comment #6: CNRCC Desert Committee comments that in analyzing cumulative impacts to special status plants, the FSA/DEIS should analyze impacts across the range of these species as well as ways to avoid and minimize these impacts. If avoidance is infeasible, mitigation must ensure that the loss of the individual plants and the cumulative impacts from those losses will in fact be adequately compensated for each species impacted.

> Staff Response: Staff carefully considered the cumulative effects of the Project on special-status plants directly affected, across their range, and looked at ownership of occurrences and the threats to occurrences across their range from weeds, ORV, *etc*. Condition of Certification **BIO-19** includes detailed avoidance and minimization measures for occurrences that can feasibly be avoided (occurrences along the linears and surrounding the project). For occurrences that cannot be feasibly avoided, staff has specified detailed mitigation measures for compensating through acquisition and protection of off-site occurrences that could otherwise be developed in the future, and through restoration or rehabilitation of off-site occurrences degraded by weeds, ORV, and other factors.

CNRCC Desert Committee Comment #7: CNRCC Desert Committee comments the scope of the cumulative impacts analysis should encompass the Sonoran/transition desert areas of the California desert at a minimum. Additionally, the cumulative impacts analysis should address species migration needs that may be caused by global climate change and should ensure broad landscape level corridor needed to accommodate the uncertainties involved in forecasting species migration. Not only migration needs but also ecological processed such as sand flow to and from dunes, need to be addressed.

> Staff Response: Subsection C.2.8 provides a detailed and quantitative cumulative impact analysis for sensitive, listed threatened, or endangered species and their habitat within the NECO planning area and the Chuckwalla Valley. Staff included the entire Northern and Eastern Colorado Desert region of California (NECO), an area that is synonymous with, or roughly approximates, the Sonoran Desert region of California. Staff also looked at the full range of the

affected special-status plant species, including those likely to be found during the late season surveys. Staff considered the importance of preserving critical refugia for species dispersal to higher elevations and more mesic settings in its analysis of the significance of cumulative effects, and incorporated these concerns into **BIO-19** (Special-Status Plant Mitigation). **Appendix B** describes the Desert Wildlife Management Area management strategies that could achieve the goals of preservation and enhancement of wildlife connectivity between critical refugia in the NECO planning area. Staff supports these programmatic efforts and believes they represent an excellent means of integrating the State's and BLM's renewable resources goals and environmental protection goals.

CNRCC Desert Committee Comment #8: CNRCC Desert Committee comments that it is unclear as to how many years of surveys were conducted for each project.

Staff Response: Detailed surveys for all biological resources were conducted in spring of 2009 and again in spring 2010. Staff has also required a variety of pre-construction surveys in 2010, and a survey of the entire Project Disturbance Area in summer-fall 2010 for late season special-status plants.

CNRCC Desert Committee Comment #9: CNRCC Desert Committee comments that the lack of fall surveys may under-represent the full suite of rare plant taxa potentially occurring on site. These need to be done on all project sites. Botanical surveys should be deemed inadequate until additional surveys are conducted in late summer and fall in a year with adequate summer rainfall.

Staff Response: Condition of Certification **BIO-19** commits the Applicant to conduct floristic surveys of the entire Project Disturbance Area during the late summer/fall blooming season for special-status plants. Staff analyzed the effects of the Project on late season special-status plants known to occur within a very broad region extending into the Mojave Desert region and has specified performance standards for compensatory mitigation, and triggers for mitigation for any species that may be detected, based on the species rarity (rarity and threat rankings) and their total documented occurrences.

CNRCC Desert Committee Comment #10: CNRCC Desert Committee comments that without adequate surveys an accurate accounting of impacts to rate plants is not complete. It would be a violation of environmental laws to constrain the timeframe for project review and approval such that adequate data collection and analysis or adequate public review and input are precluded prior to a Committee decision.

Staff Response: Staff fully analyzed the potential impacts to late-season special-status plants. Staff considers that condition of certification **BIO-19** is adequate to achieve NEPA/CEQA conformance because it has a specific commitment to mitigate and contains detailed performance standards and guidelines for how and when to mitigate. In addition, **BIO-19** requires agency review and approval of the proposed mitigation to ensure that the performance standards are met.

CNRCC Desert Committee Comment #11: The CNRCC Desert Committee comments that the Genesis project site may be the least appropriate of the three solar project

currently being scoped in Riverside County as it is isolated from transmission, has a linear footprint which imposes a more of a threat to wildlife movement, and is sited immediately adjacent to designated wilderness and a lake shoreline.

> Staff Response: Staff analyzed the impacts of the Project to wildlife movement, and also assessed the impacts associated with Project construction near a designated wilderness and adjacent to a dry lake. Staff has concluded that the footprint of the Project avoids sensitive habitat types such as sand dunes and playa.

CNRCC Desert Committee Comment #12: The CNRCC Desert Committee comments that the project should be pulled back from dunes and other sensitive areas on site or preferably moved to an alternative site closer to existing disturbance and transmission. CNRCC Desert Committee also comments that the assertion that little or no impact to wildlife waters will occur from extracting groundwater needs to be fully investigated. The CNRCC Desert Committee also asserts that brackish groundwater may still have value to plant species and wildlife.

> Staff Response: The Project avoids most impacts to sand dune habitat, and with recent changes to the Project footprint (TTEC 2010o) less than one acre of sand dune habitat would be affected. Staff agrees that potential Project impacts to groundwater dependent vegetation require monitoring and adaptive management, and in Conditions of Certification **BIO-25** and **BIO-26** has provided specific recommendations for performance standards and, monitoring, and remedial action if impacts are detected.

C.2.12 CONCLUSIONS

Overview of Impacts to Biological Resources

The Genesis Solar Energy Project (Genesis Project or Project) would have significant impacts to biological resources, eliminating all of the Sonoran creosote bush scrub and other native plant and wildlife communities within the approximately 1,880-acre site. The Genesis Project would result in loss of an extensive network of desert washes comprising 91 acres of state jurisdictional waters, and would significantly alter the hydrology of the area by re-routing ephemeral drainages through engineered channels.

The Project site provides habitat for desert tortoise, a species listed as threatened under the federal and state endangered species acts. The Project would impact 1,772 acres of desert tortoise habitat, including 23 acres within the Chuckwalla Desert Critical Habitat Unit. Construction and operation of the Genesis Project would therefore require state and federal endangered species “take” authorization. In addition to direct loss of habitat the Project would fragment and degrade adjacent native plant and wildlife communities, and could promote the spread of invasive non-native plants and desert tortoise predators such as ravens.

The California Energy Commission (Energy Commission) staff has concluded that without mitigation the Genesis Project would contribute to the cumulatively significant loss of biological resources within the Chuckwalla Valley and the Northern and Eastern

Colorado Desert Coordinated Management Plan (NECO) area. Staff recommends compensatory mitigation to offset direct, indirect, and cumulative impacts to desert tortoise and other special-status species, and to assure compliance with state and federal laws such as the federal and state endangered species acts and regulations protecting waters of the state. With implementation of staff's proposed conditions of certification, Project impacts to biological resources would be reduced to less than significant levels.

Mitigation for Desert Tortoise

The measures in staff's proposed Conditions of Certification **BIO-9** through **BIO-11** would avoid and minimize potential take of desert tortoise during Project construction and operation. To offset the loss of 1,749 acres of desert tortoise habitat not located within critical habitat, staff's proposed Condition of Certification **BIO-12** recommends habitat compensation at a 1:1 ratio for desert tortoise (i.e., acquisition and preservation of one acre of compensation lands for every acre lost). For Project impacts to 23 acres of Chuckwalla Desert Critical Habitat Unit, the mitigation ratio would be 5:1. This compensatory mitigation is consistent with recommendations from the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), and BLM guidance in the NECO. Staff's proposed Condition of Certification **BIO-12** also requires that the land acquisitions be within the Colorado Desert Recovery Unit, and have potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise populations and designated critical habitat. These conditions satisfy the California Department of Fish and Game's requirements under Section 2081 of the California Fish and Game Code. Staff's proposed Condition of Certification **BIO-13** requires implementation of a Raven Monitoring, Management and Control Plan to address Project-related increases in ravens, a desert tortoise predator.

Desert Tortoise Mitigation

Federal and state agencies are currently collaborating as the Renewable Energy Action Team (REAT) to establish joint policies and plans to expedite development of California's utility scale renewable energy projects. To accomplish this goal these agencies are developing a Desert Renewable Energy Conservation Plan (DRECP), a science-based process for reviewing, approving, and permitting renewable energy applications in California. Once the DRECP is complete, anticipated in late 2012, the plan will provide tools to expedite coordination of federal and state endangered species act permitting and a framework for implementing regionally coordinated land acquisition and mitigation. In the future, the DRECP may provide additional mitigation options for large-scale renewable energy projects.

Impacts to Mojave Fringe-toed Lizards

The Genesis Project would directly impact 66 acres of Mojave fringe-toed lizard habitat (including 1 acre of dunes and 37 acres of playa with sand drifts) and indirectly affect 151 acres of habitat downwind of the Project Disturbance Area. The indirect impact results from the Project solar arrays extending into the wind sand transport corridor, diminishing the input of sand to downwind areas and reducing the active sand layer that is crucial to Mojave fringe-toed lizard habitat. The Mojave fringe-toed lizards in the Chuckwalla Valley are at the southernmost portion of the species range, and the proposed Project could increase the risks of local extirpation of an already fragmented

and isolated population. Staff's proposed Condition of Certification **BIO-20** recommends acquisition and protection of core populations of Mojave fringe-toed lizard habitat in the Chuckwalla Valley, which would reduce Project impacts to less than significant levels.

Development of proposed projects would result in the direct loss of over 16 percent of all Mojave fringe-toed lizard habitat in the NECO planning area, effects that are all the more significant when combined with the expected indirect effects to Mojave fringe-toed lizard habitat, including: interruption of wind sand transport processes; diversions of desert washes and interruption of fluvial transport of sand that contribute to the maintenance of habitat; an increase in predation from ravens and direct mortality from an increase of vehicles in previously undisturbed habitat, and the continuing spread of non-native, weedy species such as Sahara mustard and Russian thistle in the Chuckwalla Valley. Staff considers these cumulative direct and indirect effects of to the Chuckwalla Valley population of Mojave fringe-toed lizards and their habitat to be significant. The Project's contributions to significant impacts would be mitigated to less than significant levels with implementation of staff's proposed conditions of certification.

Ephemeral Drainages

The Project would directly impact 91 acres of state jurisdictional waters, including 16 acres of microphyllous riparian vegetation, eliminating the hydrological, biogeochemical, vegetation, and wildlife functions of this network of ephemeral drainages. As many as 21 acres of ephemeral drainages downstream of the Project area could also be indirectly impacted by changes in upstream hydrology. Staff considers the direct, indirect, and cumulative impacts to ephemeral drainages to be significant. The measures in staff's proposed Condition of Certification **BIO-22** would minimize and offset direct and indirect impacts to state waters to less than significant levels and would assure compliance with CDFG codes that provide protection to these state waters. These measures include acquisition and enhancement of 132 acres of ephemeral dry washes within the Chuckwalla Valley watershed, as well as avoidance and minimization measures to protect drainages near the Project site.

As described in more detail in the following section, the removal of an approximate 40-acre 'toe' area from the plant site footprint would avoid several ephemeral drainages; however, the reduced and revised impact acreage to state waters was not provided at the time this Revised Staff Assessment was prepared.

Special-Status Plants

No federal or state-listed plant species occur within the Project Disturbance Area but four species of special-status plants were detected within the Study area during spring 2009 and 2010 surveys, including Harwood's milk-vetch, desert unicorn plant, and ribbed cryptantha. Harwood's eriastrum, a California endemic and BLM Sensitive species, was detected at the Colorado River Substation site and along the Project linears east of the substation. Harwood's eriastrum has a global distribution restricted to the southeast corner of California, and it is known from only 14 documented locations, several of which are historic records that have not been verified.

Staff concludes that the Project's direct, indirect, and cumulative impacts to Harwood's eriastrum and Harwood's milk-vetch are significant, but impacts to ribbed cryptantha are

less than significant. The alteration of the surface drainage patterns and sediment transport, and the stabilization of dune habitats from an increase in the spread and density of Sahara mustard that would result from the proposed Project would affect rare plants indirectly by disrupting the basic geomorphic processes that maintain and sustain these species' habitat. The remaining occurrences are also stressed by the cumulative effects of fragmentation and isolation from the many foreseeable future projects proposed in the Chuckwalla Valley and throughout their range. While the direct effects of the Project on desert unicorn plant are minor, the impacts of all probable future projects are cumulatively considerable. The avoidance, minimization and compensation measures described in Condition of Certification **BIO-19** (Special-Status Plant Mitigation) would minimize the impacts to Harwood's eriastrum and Harwood's milk-vetch to a level less than significant, and would reduce the Project's contribution to cumulative effects to a level less than significant.

Based on consultation with recognized experts in the flora of the California Desert region staff has also concluded that potentially significant impacts to special-status plants could be missed unless additional late season surveys are conducted. Late-season plants regarded as having a moderate to high potential for occurrence—that could not be detected during the 2009 or 2010 spring surveys—include: Abram's spurge, flat-seeded spurge, and lobed ground cherry. **BIO-19** includes a requirement to conduct late-season surveys in summer-fall 2010. Specific triggers for mitigation of any special-status plant detected, and detailed performance standards for mitigation of impacts are included in **BIO-19** to ensure that impacts to any special-status plants found during the late season surveys are mitigated to a level less than significant.

Impacts to Groundwater Dependent Vegetation Communities

The proposed Project's groundwater pumping would have an impact on groundwater levels in the Chuckwalla Valley Groundwater Basin (see **Soil and Water** section). The Project's estimated zone of drawdown effects at the end of project operation extends to approximately 9 to 10 miles from the Project pumping well, decreasing in effect with distance from the well. Groundwater is important to sustain vegetation for wildlife habitat in some areas where surface waters are not present. Even minor drawdowns can adversely affect groundwater-dependent vegetation ("phreatophytes") and the wildlife it sustains if: groundwater drops below the effective rooting levels sustained over time (so that plants never have an opportunity to recover); water tables drop not just in summer (when plants are dormant) but throughout early spring when plants need and utilize water most and when they are least tolerant of drought, or if the Project groundwater use occurs during extended droughts.

Groundwater-dependent vegetation occurs at the northeast margin of Palen Dry Lake where groundwater has been observed near surface. Phreatophytes have also been documented and observed at the southwest margins of Palen and they occur sporadically at Ford Dry Lake, where groundwater levels are deeper. The project has the potential to lower groundwater levels as a result of water production during both construction and operations. The lowering of groundwater levels could have a significant impact to biological resources in areas where deep-rooted phreatophytes occur. Considerable uncertainty remains as to the potential extent of Project impacts to groundwater (see **Soil and Water** section) and to groundwater dependent plant communities, but staff considers these potential impacts to be significant.

To ensure that the Project's proposed use of groundwater does not lower groundwater levels in the basin so that biological resources are significantly and adversely affected, staff has proposed that the Applicant develop a vegetation monitoring program and identify what changes are occurring in basin water levels and in groundwater-dependent vegetation within the identified zone of potential effect. Substantial changes to groundwater levels caused by the proposed Project and other pumping in the basin would be documented by the Groundwater Well Monitoring and Reporting program outlined in Condition of Certification **SOIL&WATER-5**. Changes in the vigor of groundwater-dependent vegetation would be monitored, compared against controls, and documented under the Vegetation Monitoring and Reporting Plan outlined in staff's proposed Condition of Certification **BIO-25**. Condition of Certification **BIO-26** specifies remedial action to be taken and the performance standard that must be met if adverse effects are detected. These measures would be sufficient to ensure that the groundwater pumping for the Project would not result in significant adverse impacts to groundwater-dependent ecosystems in the Chuckwalla Basin.

Migratory Birds/Burrowing Mammals

Sonoran creosote bush scrub and ephemeral drainages within the Project Area provide foraging, cover, and/or breeding habitat for migratory birds, including a number of special-status bird species potentially occurring at the site (including loggerhead shrike, western burrowing owl, and California horned lark). Migratory birds and their eggs and young are protected by the federal Migratory Bird Treaty Act and Fish and Game Code section 3503. Implementation of staff's proposed Conditions of Certification **BIO-8** (Impact Avoidance and Best Management Practices), **BIO-15** (Pre-Construction Nest Surveys), and **BIO-16** (Avian Protection Plan) would avoid these potentially significant impacts to nesting birds. Potential impacts to burrowing owls would be further mitigated by implementation of staff's proposed Condition of Certification **BIO-18**. This condition involves avoidance and minimization measures, passive relocation of burrowing owls if necessary, as well as acquisition of off-site habitat suitable for burrowing owl.

American badgers and desert kit foxes occur throughout the Project area, and construction activities could crush or entomb these burrowing species. Staff's proposed Condition of Certification **BIO-17**, which requires preconstruction surveys and avoidance measures to protect badgers and kit foxes, would avoid these potential impacts.

Impacts and Mitigation for Golden Eagles

Although golden eagles were not detected during the avian surveys conducted for the Project, no focused survey for nest sites or breeding pairs was conducted. Surveys were conducted in 2010 for golden eagle territories within 10 miles of the Project boundaries, but survey results were not available at the time of publication of the RSA. In the absence of survey information, staff analyzed the potential impacts to nesting golden eagles using the conservative assumption that nests might occur close enough to Project boundaries to be disturbed by construction activities. Staff's proposed Condition of Certification **BIO-28,** implementation of a golden eagle monitoring and management program, would mitigate potential impacts from construction to less than significant levels. Staff also concluded that the Project would contribute to the cumulative loss of golden eagle foraging habitat, but staff's proposed Condition of

Certification **BIO-12** would compensate for the Project's contribution to the cumulative loss of golden eagle foraging habitat.

Project Closure and Decommissioning

Staff's proposed Condition of Certification **BIO-23** requires the Applicant to develop a Decommissioning and Closure Plan and a cost estimate that meets the requirements of BLM's 43 CFR 3809.550 et seq.. Condition of Certification **BIO-23** also requires a cost estimate of the funding required to undertake those activities.

Alternatives

Staff analyzed two alternatives to the Proposed Project other than the No Project Alternative, the Reduced Acreage Alternative and the Dry Cooling Alternative. The smaller Reduced Acreage Alternative would have smaller impacts on many of the biological resources within the Project area, and substantially less impact on Mojave fringe-toed lizard habitat. The Reduced Acreage Alternative would use approximately 50 percent less groundwater than the Proposed Project. Because the linear facilities for the Proposed Project and the Reduced Acreage Alternatives share the same route, impacts associated with this corridor remain very similar, such as impacts to Couch's spadefoot toad and microphyll woodland. In addition, although the Reduced Acreage Project does represent fewer acres of impacts, it is the same overall length as the Proposed Project, and therefore indirect impacts to desert washes that currently flow through the area would be similar.

The Dry Cooling Alternative is located entirely within the boundaries of the Proposed Project. Because this alternative would occupy the same footprint as the Proposed Project, the impacts remain the same between the two except for impacts to groundwater-dependent ecosystems. The Dry Cooling Alternative would use over 95 percent less groundwater than the Proposed Project.

Staff considers direct, indirect, and cumulative impacts from the Proposed Project and both alternatives to be similar (aside from differences in impact acreage) for most biological resources, including impacts to desert tortoise habitat, Couch's spadefoot toad, microphyll woodland, and migratory birds. While impacts from the Reduced Acreage Alternative are substantially less to Mojave fringe-toed lizard habitat and desert wash, these impacts would still be considered significant under this alternative as well as under the Proposed Project and Dry Cooling Alternative. Staff currently has insufficient information to fully assess the indirect and cumulative impacts to groundwater-dependent vegetation, but these impacts may be considered significant under the Proposed Project and the Reduced Acreage Alternative. Impacts from the Dry Cooling Alternative are identical to those from the Proposed Project, except that this alternative would eliminate any potential Project impacts to groundwater-dependent vegetation.

Proposed conditions of certification under the Reduced Acreages Alternative are identical to those for the Proposed Project, except that the compensatory mitigation acreages recommended for desert tortoise habitat (staff's proposed Condition of Certification **BIO-12**), western burrowing owl (staff's proposed Condition of Certification **BIO-18**), sand dunes (staff's proposed Condition of Certification **BIO-20**), Mojave fringe-

toed lizards (staff's proposed Condition of Certification **BIO-20**), and state waters (staff's proposed Condition of Certification **BIO-22**) are adjusted to reflect the reduced areas of impacts. Proposed conditions of certification under the Dry Cooling Alternative are identical to those for the Proposed Project, except that proposed Condition of Certification **BIO-25** and **BIO-26** would not be required. Staff concludes that with implementation of these conditions, impacts from both alternatives would be less than significant.

Cumulative Effects

Construction and operation of the Genesis Project will have effects on a number of biological resources that are individually limited but cumulatively considerable. The cumulative effects analysis employed a quantitative, GIS-based analysis of direct impacts to habitat, and a qualitative analysis of indirect effects (e.g., increases in predators, noxious weeds, etc.). In many cases, the anticipated indirect effects are more significant, or adverse, than the direct loss of habitat, but are more difficult to quantify. Geographic scope varied between biological resources, but most analyses were based on the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) boundaries (BLM-CDD 2002).

Significant cumulative effects (including indirect effects) were identified in a number of biological resource areas where the Project contributes—at least incrementally—to the cumulative effect. These include: desert washes in the Ford Watershed and the broader NECO planning area; desert tortoise habitat; golden eagle foraging habitat; Mojave fringe toed lizard and their habitat; habitat for American badger, desert kit fox, and burrowing owl; LeConte's thrasher habitat; Couch's spadefoot toad range; habitat for Harwood's milk-vetch and other dune/playa-dependent special-status plants; wildlife habitat and connectivity within the Palen-Ford WHMA (for Mojave fringe toed lizard, dunes, and playa); Mojave and Sonoran creosote bush scrub; desert dry wash woodland (microphyll woodland); playa and sand drifts over playa, and dunes (active and stabilized).

Of particular concern are the cumulative effects of renewable energy projects within the geographic scope of the Chuckwalla Valley, which contains an isolated system of dunes and population of Mojave fringe-toed lizard. The direct loss of dune habitat and Mojave fringe-toed lizard is minor relative to the indirect downwind effects from obstructions within the active aeolian sand transport corridor, and the disruption of the fluvial processes that contribute sand to the system from the diversion of washes--approximately 63 miles of washes within the Chuckwalla-Ford Dry Lake watershed alone. In addition to the disruption of geomorphic processes, significant indirect effects that can be reasonably expected to occur in the Chuckwalla system from future projects include: fragmentation and its effects on connectivity and gene flow; spread of invasive non-native plants; increase in avian predators; and an increase in vehicle-related wildlife mortality.

Implementation of staff's proposed conditions of certification would reduce the Project's contribution to cumulative effects to a level that is not cumulatively considerable. There may be cumulative effects after mitigation is implemented by all projects, but due to the mitigation implemented by the Project, its contribution would be less than cumulatively considerable. These residual cumulative effects from all future projects could be

addressed through a regional and coordinated planning effort aimed at preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors.

Ongoing collaborative efforts by federal and state agencies to develop a Desert Renewable Energy Conservation Plan and BLM's Solar Energy Development Programmatic EIS offer an appropriate forum for such planning. Appendix B describes the Desert Wildlife Management Area management strategies that could achieve the goals of preservation and enhancement of wildlife connectivity in the NECO planning area. Staff supports these programmatic efforts and believes they represent an excellent means of integrating the State's and BLM's renewable resources goals and environmental protection goals.

C.2.13 PROPOSED CONDITIONS OF CERTIFICATION

The accelerated timing requirements described in these proposed conditions of certification reflect the need for the Genesis Solar Power Project to commence construction before the end of 2010 in order to receive American Recovery and Reinvestment Act of 2009 (ARRA) funding.

The proposed conditions of certification below are generally the same as those in the SA/DEIS published in March 2010. However, revisions have been made in some of the conditions to reflect suggested changes, clarifications and additional information from the Applicant and other parties and from discussions at staff workshops held on April 21, May 5, and May 10, 2010. Updated guidance from the USFWS about golden eagle surveys provided the basis for a new condition, **BIO-28**. In addition, opportunities for mitigation from recently signed legislation (SB8X 34) and the Renewable Energy Action Team Memorandum of Agreement prompted changes in **BIO-12** and other conditions. **Biological Resources Table 22** summarizes the changes to proposed conditions of certification from the SA/DEIS.

BIOLOGICAL RESOURCES TABLE 22-
Summary of Changes to Conditions of Certification

Condition of Certification	Changes from SA/DEIS
BIO-1 Designated Biologist Selection and Qualifications	Minor clarifications in the definition of “Authorized Biologist”; replaced the trigger for verification timing from post-Energy Commission Decision to pre-construction.
BIO-2 Designated Biologist Duties	No changes
BIO-3 Biological Monitor Selection and Qualifications	No changes
BIO-4 Biological Monitor Duties	Minor additions to list of Biological Monitor duties.
BIO-5 Designated Biologist and Biological Monitor Authority	No changes.

Condition of Certification	Changes from SA/DEIS
BIO-6 Worker Environmental Awareness Program	Replaced the trigger for verification timing from post-Energy Commission Decision to pre-construction.
BIO-7 Biological Resources Mitigation Implementation & Monitoring Plan	Clarified that the BRMIMP shall include all biological mitigation and/or monitoring plans associated with the Project; changed the timing for submittal of the final BRMIMP to 7 days before construction rather than 30 days; revised to allow the BRMIMP to be revised or supplemented with additional permits.
BIO-8 Impact Avoidance and Minimization Measures	Specified speed limits of 25 mph on all roads, and added a requirement for signage; clarified requirements for monitoring during construction in unfenced habitat; modified the requirement for avoidance of loud construction noise; made minor changes to measures avoiding vehicle impacts to desert tortoise, and treatment of road-killed animals.
BIO-9 Desert Tortoise Clearance Surveys and Fencing	Made clarifications on installation of desert tortoise exclusion fencing, deleted the requirement for cattle grating at gates, provided more specificity on how clearance surveys would be conducted, and incorporated reference methods included in the Desert Tortoise Translocation Plan.
BIO-10 Desert Tortoise Translocation Plan	Deleted “Relocation” from the title “desert Tortoise Relocation/Translocation”, replaced the trigger for verification timing from post-Energy Commission Decision to pre-construction.
BIO-11 Desert Tortoise Compliance Verification	Minor clarifications on monitoring during grubbing and grading and notification in the event of an injured desert tortoise.
BIO-12 Desert Tortoise Compensatory Mitigation	Extensively revised to clarify requirements for security; added a provision to allow fulfillment of mitigation requirements by depositing funds into a National Fish and Wildlife Foundation account managed by the Renewable Energy Action Team.
BIO-13 Raven Management Plan	Expanded to include more specific information on the purpose of the plan and a description of the required elements of a Raven Plan; changed submittal of final Raven Plan from 10 days to 30 days prior to construction. Also expanded to include the fee payment option for the project owner submitting payment to the Project sub-account of the REAT Account held by the National Fish and Wildlife Foundation (NFWF) to support the USFWS Regional Raven Management Program.
BIO-14 Weed Management Plan	Expanded to include more specific information on the purpose of the plan and a description of the required elements of the Weed Management Plan.

Condition of Certification	Changes from SA/DEIS
BIO-15 Pre-Construction Nest Surveys	Added a reference to guide nest searching techniques; clarified that the precise location of the nest need not be determined by searchers; changed the end date of the breeding bird survey from August 31 to July 31; specified that surveyors may not concurrently search for nests and desert tortoise burrows. Based on guidance from USFWS, added guidance on how to determine the size of the protective buffer around nests, and reduced from 14 to 7 days interval between nest
BIO-16 Avian Protection Plan	Added the requirement that adaptive management measures be included to avoid and minimize avian impacts; replaced the trigger for verification timing from post-Energy Commission Decision to before commercial operation.
BIO-17 Badger and Kit Fox Avoidance and Minimization Measures-	Revised to provide alternative measures for excluding foxes and badgers from burrows, and to clarify that surveys for fox and badgers dens may be conducted concurrent with desert tortoise surveys.
BIO-18 Burrowing Owl Impact Avoidance and Minimization Measures	Added specifications that pre-construction surveys for owls must be focused exclusively on detecting burrowing owls, and must be conducted as dawn or dusk surveys within 30 days of construction; added monitoring and reporting guidelines for the relocation site; replaced the trigger for verification timing from months 18 months after the Energy Commission Decision to 18 months after initiation of construction.
BIO-19 Special-Status Plant Impact Avoidance and Minimization	Extensively revised and expanded to include: a requirement to conduct summer-fall surveys; specifications for finalizing avoidance and minimization measures; thresholds for assessing significance of impacts to late season special-status plants and conditions under which avoidance or off-site mitigation would be required; and detailed guidelines and performance standards for off-site mitigation through acquisition or restoration/enhancement.
BIO-20 Sand Dune Community/Mojave Fringe-Toed Lizard Mitigation	Revised the acreage of requires acquisition lands to reflect the reduction in Project footprint by 41.4 acres; made minor changes to the criteria for acquisition lands; clarified that the final security amount for acquisition would be determined by an updated appraisal and a Property Analysis Record (PAR) analysis; replaced the trigger for verification timing from months 18 months after the Energy Commission Decision to 18 months after initiation of construction.
BIO-21 Evaporation Pond Monitoring	Provided more specific information on what monthly monitoring surveys would entail.
BIO-22 Mitigation for	Clarified that the final security amount for acquisition would

Condition of Certification	Changes from SA/DEIS
Impacts to State Waters	be determined by an updated appraisal and a PAR analysis; minor wording changes and clarifications; replaced the trigger for verification timing from post Energy Commission Decision to prior to ground-disturbing activities.
BIO-23 Decommissioning Plan	Deleted the requirement that one of the objectives of decommissioning must include restoration of the site to a relatively natural requirement; replaced the trigger for submittal of draft plan from post Energy Commission Decision to prior to ground-disturbing activities, with the final plan due before start of commercial operation.
BIO-24 Revegetation of Temporarily Disturbed Areas	Clarified the target performance standards for percent cover of native species in the temporarily disturbed areas; replaced the trigger for submittal of final plan from post Energy Commission Decision to prior to ground-disturbing activities.
BIO-25 Monitoring Groundwater Dependent Vegetation	Revised to clarify responsibility for monitoring in areas where the zone of potential groundwater effects of Genesis Solar Energy Project overlap the Palen Solar Power Project estimated zone of groundwater effect.
BIO-26 Remedial Action for Groundwater Dependent Vegetation	Added examples of remedial actions that may be implemented to meet the performance standards for mitigation.
BIO-27 Couch's Spadefoot Toad Mitigation	Replaced the trigger for submittal of final plan from post Energy Commission Decision to prior to ground-disturbing activities; added a mitigation requirement that if potential spadefoot toad breeding ponds cannot be completely avoided, the migation plan shall include plans to create additional breeding habitats that are capable of holding water for at least nine days during the spadefoot toad breeding season.
BIO-28 Golden Eagle Inventory & Monitoring	New condition. Requires annual inventories for golden eagles during construction and implementation of a monitoring and management plan if nests are detected within 10 miles of Project boundaries.
BIO-29 In-Lieu Fee Mitigation Option	New condition. Provides an option for the project owner to satisfy mitigation obligations by paying an in lieu fee instead of acquiring compensation lands, pursuant to Fish and Game code sections 2069 and 2099.

DESIGNATED BIOLOGIST SELECTION AND QUALIFICATIONS[6]

BIO-1 The Project owner shall assign at least one Designated Biologist to the Project. The Project owner shall submit the resume of the proposed Designated Biologist(s), with at least three references and contact information, to the Energy Commission Compliance Project Manager (CPM) for approval in consultation with CDFG and USFWS.

The Designated Biologist must meet the following minimum qualifications:

1. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;

2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society;

3. Have at least one year of field experience with biological resources found in or near the Project area;

4. Meet the current USFWS Authorized Biologist qualifications criteria (www.fws.gov/ventura/speciesinfo/protocols_guidelines), demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the USFWS; and

5. Possess a California ESA Memorandum of Understanding pursuant to Section 2081(a) for desert tortoise.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM, in consultation with CDFG and USFWS, that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the conditions of certification.

No fewer than 30 days prior to construction-related ground disturbance, the Project owner shall submit the names of the Designated Biologists(s) along with the completed USFWS Desert Tortoise Authorized Biologist Request Form (www.fws.gov/ventura/speciesinfo/protocols_guidelines) and submit it to the USFWS, and the CPM for review and final approval. No construction-related ground disturbance, grading, boring, or trenching shall commence until an approved Designated Biologist is available to be on site.

If a Designated Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to the CPM at least 10 working days prior to

[6] USFWS <www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/dt> designates biologists who are approved to handle tortoises as “Authorized Biologists.” Such biologists have demonstrated to the USFWS that they possess sufficient desert tortoise knowledge and experience to handle and move tortoises appropriately, and have received USFWS approval. Authorized Biologists are responsible for the implementation of all desert tortoise measures for which a project is approved and are permitted to then approve specific Biological Monitors to handle tortoises, at their discretion. The California Department of Fish and Game (CDFG) must also approve such biologists, potentially including individual approvals for Biological Monitorns approved by the Authorized Biologist. **Designated Biologists are the equivalent of Authorized Biologists.** Only Designated Biologists and certain Biological Monitors who have been approved by the Designated Biologist would be allowed to handle desert tortoises.

the termination or release of the preceding Designated Biologist. In an emergency, the Project owner shall immediately notify the CPM to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to the CPM and for consideration.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The Project owner shall ensure that the Designated Biologist performs the activities described below during any site mobilization activities, construction-related ground disturbance, grading, boring or trenching activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the Project owner and the CPM. The Designated Biologist Duties shall include the following:

1. Advise the Project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;

2. Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the Project owner;

3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitat;

4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;

5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm’s way;

6. Notify the Project owner and the CPM of any non-compliance with any biological resources condition of certification;

7. Respond directly to inquiries of the CPM regarding biological resource issues;

8. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Compliance Report;

9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness

Program (WEAP) training, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>; and

10. Maintain the ability to be in regular, direct communication with representatives of CDFG, USFWS, and the CPM, including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Database.

Verification: The Designated Biologist shall provide copies of all written reports and summaries that document biological resources compliance activities in the Monthly Compliance Reports submitted to the CPM. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting. During Project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his or her duties cease, as approved by the CPM.

BIOLOGICAL MONITOR SELECTION AND QUALIFICATIONS

BIO-3 The Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitors to the CPM. The resume shall demonstrate, to the satisfaction of the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks. The Biological Monitor is the equivalent of the USFWS designated Desert Tortoise Monitor (USFWS 2008).

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification, BRMIMP, WEAP, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>.

Verification: The Project owner shall submit the specified information to the CPM for approval at least 30 days prior to the start of any site mobilization or construction-related ground disturbance, grading, boring and trenching. The Designated Biologist shall submit a written statement to the CPM confirming that individual Biological Monitor(s) has been trained including the date when training was completed. If additional biological monitors are needed during construction the specified information shall be submitted to the CPM and for approval at least 10 days prior to their first day of monitoring activities.

BIOLOGICAL MONITOR DUTIES

BIO-4 The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of site mobilization activities, construction-related ground disturbance, fencing, grading, boring, trenching and reporting. The Designated Biologist shall remain the contact for the Project owner and the CPM.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the CPM copies of all written reports and summaries that document biological resources compliance activities, including those conducted by Biological Monitors. If actions may affect biological resources during operation a Biological Monitor, under the

supervision of the Designated Biologist, shall be available for monitoring and reporting. During Project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties cease, as approved by the CPM.

DESIGNATED BIOLOGIST AND BIOLOGICAL MONITOR AUTHORITY

BIO-5 The Project owner's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources conditions of certification. The Project owner shall provide Energy Commission staff with reasonable access to the Project site under the control of the Project owner and shall otherwise fully cooperate with the Energy Commission's efforts to verify the Project owner's compliance with, or the effectiveness of, mitigation measures set forth in the conditions of certification. The Designated Biologist shall have the authority to immediately stop any activity that is not in compliance with these conditions and/or order any reasonable measure to avoid take of an individual of a listed species. If required by the Designated Biologist and Biological Monitor(s) the Project owner's construction/operation manager shall halt all site mobilization, ground disturbance, grading, boring, trenching and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;

2. Inform the Project owner and the construction/operation manager when to resume activities; and

3. Notify the CPM if there is a halt of any activities and advise them of any corrective actions that have been taken or would be instituted as a result of the work stoppage.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The Project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, or operation activities. The Project owner shall notify the CPM of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the Project owner, a determination of success or failure will be made by the CPM within five working days after receipt of notice that corrective action is completed, or the Project owner would be notified by the CPM that coordination with other agencies would require additional time before a determination can be made.

WORKER ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

BIO-6 The Project owner shall develop and implement a Project-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from the CPM. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site preconstruction, construction, operation, and closure. The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants;

2. Discuss the locations and types of sensitive biological resources on the Project site and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that no snakes, reptiles, or other wildlife shall be harmed;

3. Place special emphasis on desert tortoise, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures;

4. Include a discussion of fire prevention measures to be implemented by workers during Project activities; request workers dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;

5. Describe the temporary and permanent habitat protection measures to be implemented at the Project site;

6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and

7. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.

Verification: At least 30 days prior to start of construction-related ground disturbance the Project owner shall provide to the CPM a copy of the final WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program.

The Project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to construction-

related ground disturbance activities the Project owner shall submit two copies of the CPM-approved final WEAP.

Training acknowledgement forms signed during construction shall be kept on file by the Project owner for at least six months after the start of commercial operation.

Throughout the life of the Project, the WEAP shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the Project area. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be maintained by the Project owner and shall be made available to the CPM and upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training.

During Project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN

BIO-7 The Project owner shall develop a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP), and shall submit two copies of the proposed BRMIMP to the CPM for review and approval. The Project owner shall implement the measures identified in the approved BRMIMP. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Desert Tortoise Translocation Plan, the Raven Management Plan, the Closure, Conceptual Restoration Plan, the Burrowing Owl Mitigation and Monitoring Plan, and the Weed Management Plan, and all other individual biological mitigation and/or monitoring plans associated with the Project.

The BRMIMP shall be prepared in consultation with the Designated Biologist and shall include accurate and up-to-date maps depicting the location of sensitive biological resources that require temporary or permanent protection during construction and operation. The BRMIMP shall include complete and detailed descriptions of the following:

1. All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the Project owner;

2. All biological resources conditions of certification identified as necessary to avoid or mitigate impacts;

3. All biological resource mitigation, monitoring and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion;

4. All sensitive biological resources to be impacted, avoided, or mitigated by Project construction, operation, and closure;

5. All required mitigation measures for each sensitive biological resource;

6. All measures that shall be taken to avoid or mitigate temporary disturbances from construction activities;

7. Duration for each type of monitoring and a description of monitoring methodologies and frequency;

8. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;

9. All performance standards and remedial measures to be implemented if performance standards are not met;

10. Biological resources-related facility closure measures including a description of funding mechanism(s);

11. A process for proposing plan modifications to the CPM and appropriate agencies for review and approval; and

12. A requirement to submit any sightings of any special-status species that are observed on or in proximity to the Project site, or during Project surveys, to the California Natural Diversity Data Base (CNDDB) per CDFG requirements.

Verification: The Project owner shall submit the draft BRMIMP to the CPM at least 30 days prior to start of any preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching, and the final BRMIMP at least 7 days prior to start of any construction-related ground disturbance, grading, boring, and trenching. The BRMIMP shall contain all of the required measures included in all biological Conditions of Certification. No construction-related ground disturbance, grading, boring or trenching may occur prior to approval of the final BRMIMP by the CPM.

If any permits have not yet been received when the final BRMIMP is submitted, these permits shall be submitted to the CPM within 5 days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition(s). The Project owner shall submit to the CPM the revised or supplemented BRMIMP within 10 days following the Project owner's receipt of any additional permits. Under no circumstances shall ground disturbance proceed without implementation of all permit conditions.

To verify that the extent of construction disturbance does not exceed that described in this analysis, the Project owner shall submit aerial photographs, at an approved scale, taken before and after construction to the CPM. The first set of aerial photographs shall reflect site conditions prior to any preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching, and shall be submitted prior to initiation of such activities. The second set of aerial photographs shall be taken subsequent to completion of construction, and shall be submitted to the CPM no later than 90 days after completion of construction. The Project owner shall also provide a

final accounting of the acreages of vegetation communities/cover types present before and after construction.

Any changes to the approved BRMIMP must be approved by the CPM and in consultation with CDFG and USFWS.

Implementation of BRMIMP measures (for example, construction activities that were monitored, species observed) shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of Project construction, the Project owner shall provide to the CPM, for review and approval, a written construction termination report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the Project's preconstruction site mobilization and construction-related ground disturbance, grading, boring, and trenching, and which mitigation and monitoring items are still outstanding.

IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-8 The Project owner shall undertake the following measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to biological resources:

1. Limit Disturbance Areas. The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities in consultation with the Designated Biologist. Spoils and topsoil shall be stockpiled in disturbed areas lacking native vegetation and which do not provide habitat for special-status species. Parking areas, staging and disposal site locations shall similarly be located in areas without native vegetation or special-status species habitat. All disturbances, Project vehicles and equipment shall be confined to the flagged areas.

2. Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around would do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route shall be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

3. Minimize Traffic Impacts. Vehicular traffic during Project construction and operation shall be confined to existing routes of travel to and from the Project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit shall not exceed 25 miles per hour on all roads. Signs shall be established at appropriate locations (for example, at Arizona crossings of drainages) to remind drivers to be aware of the potential for desert tortoise and other wildlife occurring on the roadways.

4. Monitor During Construction. In areas that have not been fenced with desert tortoise exclusion fencing and cleared, including during fence construction, the Designated Biologist shall be present at the construction site during all Project activities that have potential to disturb soil, vegetation, and wildlife. The Designated Biologist or Biological Monitor shall walk immediately ahead of equipment during brushing and grading activities in unfenced habitat (i.e., outside of the cleared and fenced Plant Site).

5. Minimize Impacts of Pipeline Alignments, Roads, Staging Areas. Staging areas for construction on the plant site shall be within the area that has been fenced with desert tortoise exclusion fencing and cleared. For construction activities outside of the plant site (transmission line, pipeline alignments) access roads, pulling sites, and storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources.

6. Implement APLIC Guidelines. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) S*uggested Practices for Avian Protection on Power Lines* (APLIC 2006) and *Mitigating Bird Collisions with Power Lines* (APLIC 1994) to reduce the likelihood of large bird electrocutions and collisions.

7. Avoid Use of Toxic Substances. Soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.

8. Minimize Lighting Impacts. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat. Lighting shall be kept to the minimum level for safety and security needs by using motion or infrared light sensors and switches to keep lights off when not required, and shielding operational lights downward to minimize skyward illumination. No high intensity, steady burning, bright lights such as sodium vapor or spotlights shall be used. FAA visibility lighting shall employ only strobed, strobe-like or blinking incandescent lights, preferably with all lights illuminating simultaneously. Minimum intensity, maximum "off-phased" duel strobes are preferred, and no steady burning lights (e.g., L-810s) shall be used.

9. Minimize Noise Impacts. A continuous low-pressure technique shall be used for steam blows, to the extent possible, in order to reduce noise levels in sensitive habitat proximate to the Genesis Project. Loud construction activities (e.g., unsilenced high pressure steam blowing and pile driving, or other) shall be avoided from February 15 to April 15 when it would result in noise levels over 60 dBA in nesting habitat.

10. Avoid Vehicle Impacts to Desert Tortoise. Parking and storage shall occur within the area enclosed by desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoise. If a desert tortoise is observed, it shall be left to move on its own. A Designated Biologist or Biological Monitor under the Designated Biologist's direct supervision may remove and relocate the animal to a safe location as described in the Applicant's Desert Tortoise Translocation Plan.

11. Avoid Wildlife Pitfalls: To avoid trapping desert tortoise and other wildlife in trenches, pipes or culverts, the following measures shall be implemented:

    a. Backfill Trenches. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) outside the area fenced with desert tortoise exclusion fencing have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically throughout the day, at the end of each workday and at the beginning of each day by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual as described in the Desert Tortoise Translocation Plan. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

    b. Avoid Entrapment of Desert Tortoise. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches aboveground and within desert tortoise habitat (i.e., outside the permanently fenced area) for one or more nights, shall be inspected for tortoises before the material is moved, buried or capped. As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on elevated pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed.

12. Minimize Standing Water. Water applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises and common ravens to construction sites. A Biological

Monitor shall patrol these areas to ensure water does not puddle and shall take appropriate action to reduce water application where necessary.

13. Dispose of Road-killed Animals. During construction, road killed animals or other carcasses detected by personnel on roads associated with the Project area will be reported immediately to a Biological Monitor or Designated Biologists, who will remove the roadkill promptly. During operations, the Project Environmental Compliance Monitor will be notified of any roadkills and promptly remove and dispose of any roadkills. For special-status species road-kill, the Biological Monitor shall contact CDFG and USFWS within 1 working day of receipt of the carcass for guidance on disposal or storage of the carcass. The Biological Monitor shall report the special-status species record as described in **BIO-11** below.

14. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the Project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.

15. Worker Guidelines. During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the Project site. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons. Vehicular traffic shall be confined to existing routes of travel to and from the Project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit when traveling on dirt access routes within desert tortoise habitat shall not exceed 25 miles per hour.

16. Implement Erosion Control Measures. Standard erosion control measures shall be implemented for all phases of construction and operation where sediment run-off from exposed slopes threatens to enter “Waters of the State”. Sediment and other flow-restricting materials shall be moved to a location where they shall not be washed back into the stream. All disturbed soils and roads within the Project site shall be stabilized to reduce erosion potential, both during and following construction. Areas of disturbed soils (access and staging areas) with slopes toward drainages shall be stabilized to reduce erosion potential.

17. Monitor Ground Disturbing Activities Prior to Pre-Construction Site Mobilization. If pre-construction site mobilization requires ground-disturbing activities such as for geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of Project construction, the Project owner shall provide to the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

DESERT TORTOISE CLEARANCE SURVEYS AND FENCING

BIO-9 The Project owner shall undertake appropriate measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to desert tortoise. Methods for clearance surveys, fence specification and installation, tortoise handling, artificial burrow construction, egg handling and other procedures shall be consistent with those described in the USFWS' 2009 *Desert Tortoise Field Manual* <http://www.fws.gov/ventura/speciesinfo/protocols_guidelines> or more current guidance provided by CDFG and USFWS. The Project owner shall also implement all terms and conditions described in the Biological Opinion prepared by USFWS. These measures include, but are not limited to, the following:

1. Desert Tortoise Exclusion Fence Installation. Per the Applicant's Desert Tortoise Translocation Plan, in order to avoid impacts to desert tortoises, permanent desert tortoise exclusion fencing shall be installed along the permanent perimeter security fence; along the utility corridors, fencing or monitoring will be used to protect desert tortoises and temporarily installed along the utility corridors. The proposed alignments for the permanent perimeter fence and utility rights-of-way fencing shall be flagged and surveyed within 24 hours prior to the initiation of fence construction. Clearance surveys of the perimeter fence and utility rights-of-way alignments shall be conducted by the Designated Biologist(s) using techniques outlined in the USFWS' 2009 *Desert Tortoise Field Manual* and may be conducted in any season with USFWS and CDFG approval. Biological Monitors may assist the Designated Biologist under his or her supervision. These fence clearance surveys shall provide 100-percent coverage of all areas to be disturbed and an additional transect along both sides of the fence line. This fence line transect shall cover an area approximately 90 feet wide centered on the fence alignment. Transects shall be no greater than 15 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with the USFWS' 2009 *Desert Tortoise Field*

Manual. Any desert tortoise located during fence clearance surveys shall be handled by the Designated Biologist(s) in accordance with the Applicant's Translocation Plan.

a. Timing, Supervision of Fence Installation. The exclusion fencing shall be installed prior to the onset of site clearing and grubbing. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present.

b. Fence Material and Installation. The permanent tortoise exclusionary fencing shall be constructed in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 8 – Desert Tortoise Exclusion Fence).

c. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates may be electronically activated to open and close immediately after the vehicle(s) have entered or exited to prevent the gates from being kept open for long periods of time.

d. Fence Inspections. Following installation of the desert tortoise exclusion fencing for both the permanent site fencing and temporary fencing in the utility corridors, the fencing shall be regularly inspected. If tortoise were moved out of harm's way during fence construction, permanent and temporary fencing shall be inspected at least two times a day for the first 7 days to ensure a recently moved tortoise has not been trapped within the fence. Thereafter, permanent fencing shall be inspected monthly and during and within 24 hours following all major rainfall events. A major rainfall event is defined as one for which flow is detectable within the fenced drainage. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within 48 hours of observing damage. Inspections of permanent site fencing shall occur for the life of the project. Temporary fencing shall be inspected weekly and, where drainages intersect the fencing, during and within 24 hours following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the area for tortoise.

2. Desert Tortoise Clearance Surveys within the Plant Site. Following construction of the permanent perimeter security fence and the attached tortoise exclusion fence, the permanently fenced power plant site shall be cleared of tortoises by the Designated Biologist, who may be assisted by the Biological Monitors. Clearance surveys shall be conducted in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 6 – Clearance Survey Protocol for the Desert Tortoise – Mojave Population) and shall consist of two surveys

covering 100 percent of the project area by walking transects no more than 15-feet apart. If a desert tortoise is located on the second survey, a third survey shall be conducted. On each subsequent pass surveyors shall attempt to view all shrubs and the terrain from as many angles as possible. To achieve this, transects programmed into GPS units shall be either perpendicular, parallel but offset from transect on the previous pass, and/or approached from the opposite direction on each subsequent pass. Clearance surveys of the power plant site may only be conducted when tortoises are most active (April through May or September through October). Surveys outside of these time periods require approval by USFWS and CDFG. Any tortoise located during clearance surveys of the power plant site shall be relocated and monitored in accordance with the Desert Tortoise Translocation Plan

a. Burrow Searches. During clearance surveys all desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined by the Designated Biologist, who may be assisted by the Biological Monitors, to assess occupancy of each burrow by desert tortoises and handled in accordance with the USFWS' 2009 *Desert Tortoise Field Manual*. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined, in accordance with the Desert Tortoise Translocation Plan. Tortoises taken from burrows and from elsewhere on the power plant site shall be relocated or translocated as described in the Desert Tortoise Translocation Plan.

b. Burrow Excavation/Handling. All potential desert tortoise burrows located during clearance surveys shall be excavated by hand, tortoises removed, and collapsed or blocked to prevent occupation by desert tortoises, in accordance with the Desert Tortoise Translocation Plan. All desert tortoise handling and removal, and burrow excavations, including nests, shall be conducted by the Designated Biologist, who may be assisted by a Biological Monitor in accordance with the USFWS' 2009 *Desert Tortoise Field Manual.*

3. Monitoring Following Clearing. Following the desert tortoise clearance and removal from the power plant site and utility corridors, workers and heavy equipment shall be allowed to enter the Project site to perform clearing, grubbing, leveling, and trenching activities. A Designated Biologist or Biological Monitor shall be on site during clearing and grading activities to move tortoises missed during the initial tortoise clearance survey. Should a tortoise be discovered, it shall be relocated or translocated as described in the Desert Tortoise Translocation Plan.

4. Reporting. The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using

GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise. Desert tortoise moved from within Project areas shall be marked and monitored in accordance with the Desert Tortoise Translocation Plan.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of desert tortoise clearance surveys the Designated Biologist shall submit a report to the CPM, USFWS, and CDFG describing implementation of each of the mitigation measures listed above. The report shall include the desert tortoise survey results, capture and release locations of any translocated desert tortoises, and any other information needed to demonstrate compliance with the measures described above.

DESERT TORTOISE TRANSLOCATION PLAN

BIO-10 The Project owner shall develop and implement a final Desert Tortoise Translocation Plan (Plan) that is consistent with current USFWS approved guidelines, and meets the approval of the CPM. The goals of the Desert Tortoise Translocation Plan shall be to: relocate/translocate all desert tortoises from the project site to nearby suitable habitat; minimize impacts on resident desert tortoises outside the project site; minimize stress, disturbance, and injuries to relocated/translocated tortoises; and assess the success of the translocation effort through monitoring. The final Plan shall be based on the draft Desert Tortoise Translocation Plan submitted by the Applicant (TTEC 2010a) and shall include all revisions deemed necessary by USFWS, CDFG and Energy Commission staff.

Verification: Within 30 days prior to site mobilization or construction-related ground disturbance, the Project owner shall provide the CPM with the final version of a Plan that has been reviewed and approved by the CPM in consultation with USFWS and CDFG. All modifications to the approved Plan shall be made only after approval by the CPM, in consultation with USFWS and CDFG.

Within 30 days after initiation of relocation and/or translocation activities, the Designated Biologist shall provide to the CPM for review and approval, a written report identifying which items of the Plan have been completed, and a summary of all modifications to measures made during implementation of the Plan.

DESERT TORTOISE COMPLIANCE VERIFICATION

BIO-11 The Project owner shall provide Energy Commission staff with reasonable access to the Project site and compensation lands under the control of the Project owner and shall otherwise fully cooperate with the Energy Commission's efforts to verify the Project owner's compliance with, or the effectiveness of, mitigation measures set forth in the conditions of certification. The Project owner shall hold the Designated Biologist and the Energy Commission harmless for any costs the Project owner incurs in

complying with the management measures, including stop work orders issued by the CPM or the Designated Biologist. The Designated Biologist shall do all of the following:

1. Notification. Notify the CPM and at least 14 calendar days before initiating construction-related ground disturbance activities; immediately notify the CPM in writing if the Project owner is not in compliance with any conditions of certification, including but not limited to any actual or anticipated failure to implement mitigation measures within the time periods specified in the conditions of certification.

2. Monitoring During Grubbing and Grading. Remain onsite daily in areas located outside of permanent desert tortoise exclusion fencing while vegetation salvage, grubbing, grading and other ground-disturbance construction activities are taking place to avoid or minimize take of listed species, and verify personally or use Biological Monitors to check for compliance with all impact avoidance and minimization measures, including checking all exclusion zones to ensure that signs, stakes, and fencing are intact and that human activities are restricted in these protective zones.

3. Monthly Compliance Inspections. Conduct compliance inspections at a minimum of once per month after clearing, grubbing, and grading are completed and submit a monthly compliance report to the CPM, USFWS, and CDFG during construction.

4. Notification of Injured or Dead Listed Species. If an injured or dead listed species is detected within or near the Project Disturbance Area the CPM, CDFG, and USFWS shall be notified immediately by phone. Notification shall occur no later than noon on the business day following the event if it occurs outside normal business hours so that the agencies can determine if further actions are required to protect listed species. Written follow-up notification via FAX or electronic communication shall be submitted to these agencies within two calendar days of the incident and shall include the following information as relevant:

    a. Injured Desert Tortoise. If a desert tortoise is injured as a result of Project-related activities during construction, the Designated Biologist or approved Biological Monitor shall immediately take it to a CDFG-approved wildlife rehabilitation and/or veterinarian clinic. Any veterinarian bills for such injured animals shall be paid by the Project owner. Following phone notification as required above, the CPM, CDFG, and USFWS shall determine the final disposition of the injured animal, if it recovers. Written notification shall include, at a minimum, the date, time, location, circumstances of the incident, and the name of the facility where the animal was taken.

    b. Desert Tortoise Fatality. If a desert tortoise is killed by Project-related activities during construction or operation, a written report

with the same information as an injury report shall be submitted to the CPM, CDFG, and USFWS. These desert tortoises shall be salvaged according to guidelines described in *Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoise* (Berry 2001). The Project owner shall pay to have the desert tortoises transported and necropsied. The report shall include the date and time of the finding or incident.

5. Stop Work Order. The CPM may issue the Project owner a written stop work order to suspend any activity related to the construction or operation of the Project to prevent or remedy a violation of one or more conditions of certification (including but not limited to failure to comply with reporting, monitoring, or habitat acquisition obligations) or to prevent the illegal take of an endangered, threatened, or candidate species. The Project owner shall comply with the stop work order immediately upon receipt thereof.

Verification: No later than 2 days following the above required notification of a sighting, injury, kill, or relocation of a listed species, the Project owner shall deliver to the CPM, CDFG, and USFWS via FAX or electronic communication the written report from the Designated Biologist describing all reported incidents of injury, kill, or relocation of a listed species, identifying who was notified, and explaining when the incidents occurred. In the case of a sighting in an active construction area, the Project owner shall, at the same time, submit a map (e.g., using Geographic Information Systems) depicting both the limits of construction and sighting location to the CPM, CDFG and USFWS.

No later than 45 days after initiation of Project operation the Designated Biologist shall provide the CPM a Final Listed Species Mitigation Report that includes, at a minimum: 1) a copy of the table in the BRMIMP with notes showing when each of the mitigation measures was implemented; 2) all available information about Project-related incidental take of listed species; 3) information about other Project impacts on the listed species; 4) construction dates; 5) an assessment of the effectiveness of conditions of certification in minimizing and compensating for Project impacts; 6) recommendations on how mitigation measures might be changed to more effectively minimize and mitigate the impacts of future Projects on the listed species; and 7) any other pertinent information, including the level of take of the listed species associated with the Project.

DESERT TORTOISE COMPENSATORY MITIGATION

BIO-12 To fully mitigate for habitat loss and potential take of desert tortoise, the Project owner shall provide compensatory mitigation at a 1:1 ratio for impacts to 1749 acres, and at a 5:1 ratio for impacts to 23 acres of critical habitat, adjusted to reflect the final Project footprint. For purposes of this condition, the Project footprint means all lands disturbed in the construction and operation of the Genesis Project, including all linears, as well as undeveloped areas inside the Project's boundaries that will no longer provide viable long-term habitat for the desert tortoise. To satisfy this condition, the Project owner shall acquire, protect and transfer no fewer than 1,864 acres of desert tortoise habitat lands (adjusted to reflect the final Project footprint), and shall also

provide funding for the initial improvement and long-term maintenance and management of the acquired lands, and comply with other related requirements in this condition. Costs of these requirements are estimated to be $4,249,920 based on the acquisition of 1,864 acres and estimated per-acre costs of $500 for acquisition, $330 for initial habitat improvement, and $1,450 for long-term management. The actual costs to comply with this condition will vary depending on the final footprint of the Project, the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management as determined by a PAR report. The 1,864-acre habitat requirement, and associated funding requirements based on that acreage, will be adjusted up or down if there are changes in the final footprint of the Project.

Condition **BIO-29** may provide the Project owner with another option for satisfying some or all of the requirements in this condition.

The requirements for the acquisition, initial improvement, protection and long-term maintenance and management of compensation lands include all of the following:

1. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition shall:

    a. be within the Colorado Desert Recovery Unit, with potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands;

    b. provide habitat for desert tortoise with capacity to regenerate naturally when disturbances are removed;

    c. be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;

    d. be connected to lands where desert tortoises can be reasonably expected to occur currently occupied by desert tortoise, based on habitat or historic occurrences, ideally with populations that are stable, recovering, or likely to recover;

    e. not have a history of intensive recreational use or other disturbance that does not have the capacity to regenerate naturally when disturbances are removed or might make habitat recovery and restoration infeasible;

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

g. not contain hazardous wastes that cannot be removed to the extent that the site could not provide suitable habitat; and

h. have water and mineral rights included as part of the acquisition, unless the CPM, in consultation with CDFG, BLM and USFWS, agrees in writing to the acceptability of land without these rights.

2. Review and Approval of Compensation Lands Prior to Acquisition. The Project owner shall submit a formal acquisition proposal to the CPM describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for desert tortoise in relation to the criteria listed above, and must be approved by the CPM. The CPM will share the proposal with and consult with CDFG, BLM and the USFWS before deciding whether to approve or disapprove the proposed acquisition.

3. Compensation Lands Acquisition Requirements. The Project owner shall comply with the following requirements relating to acquisition of the compensation lands after the CPM, in consultation with CDFG, BLM and the USFWS, has approved the proposed compensation lands:

a. Preliminary Report. The Project owner, or approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary or requested documents for the proposed compensation land to the CPM. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the CPM, in consultation with CDFG, BLM and the USFWS. For conveyances to the State, approval may also be required from the California Department of General Services, the Fish and Game Commission and the Wildlife Conservation Board.

b. Title/Conveyance. The Project owner shall acquire and transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement, as required by the CPM in consultation with CDFG. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code section 65965), or to BLM or other public agency approved by the CPM in consultation with CDFG. If an approved non-profit organization holds fee title to the compensation lands, a conservation easement shall be recorded in favor of CDFG or another entity approved by the CPM. If an entity other than CDFG holds a conservation easement over the compensation lands, the CPM may require that CDFG or another entity approved by the CPM, in consultation with CDFG, be named a third party beneficiary of the conservation easement. The Project owner

shall obtain approval of the CPM, in consultation with CDFG, of the terms of any transfer of fee title or conservation easement to the compensation lands.

c. Initial Protection and Habitat Improvement. The Project owner shall fund activities that the CPM, in consultation with the CDFG, USFWS and BLM, requires for the initial protection and habitat improvement of the compensation lands. These activities will vary depending on the condition and location of the land acquired, but may include trash removal, construction and repair of fences, invasive plant removal, and similar measures to protect habitat and improve habitat quality on the compensation lands. The costs of these activities is estimated at $330 an acre, but will vary depending on the measures that are required for the compensation lands. A non-profit organization, CDFG or another public agency may hold and expend the habitat improvement funds if it is qualified to manage the compensation lands (pursuant to California Government Code section 65965), if it meets the approval of the CPM in consultation with CDFG, and if it is authorized to participate in implementing the required activities on the compensation lands. If CDFG takes fee title to the compensation lands, the habitat improvement fund must be paid to CDFG or its designee.

d. Property Analysis Record. Upon identification of the compensation lands, the Project owner shall conduct a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate amount of the long-term maintenance and management fund to pay the in-perpetuity management of the compensation lands. The PAR or PAR-like analysis must be approved by the CPM, in consultation with CDFG, before it can be used to establish funding levels or management activities for the compensation lands.

e. Long-term Maintenance and Management Funding. The Project owner shall provide money to establish an account with non-wasting capital that will be used to fund the long-term maintenance and management of the compensation lands. The amount of money to be paid will be determined through an approved PAR or PAR-like analysis conducted for the compensation lands. The amount of required funding is initially estimated to be $1,450 for every acre of compensation lands. If compensation lands will not be identified and a PAR or PAR-like analysis completed within the time period specified for this payment (see the verification section at the end of this condition), the Project owner shall either provide initial payment of $2,702,800 (calculated at $1,450 an acre for 1,864 acres) or the Project

owner shall include $2,702,800 to reflect this amount in the security that is provided to the Energy Commission under section 3.h. of this condition. The amount of the required initial payment or security for this item shall be adjusted for any change in the Project footprint as described above. If an initial payment is made based on the estimated per-acre costs, the Project owner shall deposit additional money as may be needed to provide the full amount of long-term maintenance and management funding indicated by a PAR or PAR-like analysis, once the analysis is completed and approved. If the approved analysis indicates less than $1,450 an acre will be required for long-term maintenance and management, the excess paid will be returned to the Project owner. The Project owner must obtain the CPM's approval of the entity that will receive and hold the long-term maintenance and management fund for the compensation lands. The CPM will consult with CDFG before deciding whether to approve an entity to hold the Project's long-term maintenance and management funds.

The Project owner shall ensure that an agreement is in place with the long-term maintenance and management fund holder/manager to ensure the following requirements are met:

i. Interest. Interest generated from the initial capital long-term maintenance and management fund shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action that is approved by the CPM in consultation with CDFG and is designed to protect or improve the habitat values of the compensation lands.

ii. Withdrawal of Principal. The long-term maintenance and management fund principal shall not be drawn upon unless such withdrawal is deemed necessary by the CPM, in consultation with CDFG, or by the approved third-party long-term maintenance and management fund manager, to ensure the continued viability of the species on the compensation lands.

iii. Pooling Long-Term Maintenance and Management Funds. An entity approved to hold long-term maintenance and management funds for the Project may pool those funds with similar non-wasting funds that it holds from other projects for long-term maintenance and management of compensation lands for local populations

of desert tortoise. However, for reporting purposes, the long-term maintenance and management funds for this Project must be tracked and reported individually to the CPM and CDFG..

f. Other expenses. In addition to the costs listed above, the Project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to the title and document review costs incurred from other state agency reviews, overhead related to providing compensation lands to CDFG or an approved third party, escrow fees or costs, environmental contaminants clearance, and other site cleanup measures.

g. Management plan. The Project owner or approved third party shall prepare a management plan for the compensation lands in consultation with the entity that will be managing the lands. The plan shall be submitted for approval of the CPM, in consultation with CDFG, BLM and USFWS.

h. Mitigation Security. The Project owner shall provide financial assurances to the CPM, with copies of the final document to CDFG, to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by this condition that are not completed prior to the start of ground-disturbing Project activities. Financial assurances shall be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("Security") approved by the CPM in consultation with CDFG. Prior to submitting the Security to the CPM, the Project owner shall obtain the CPM's approval, in consultation with CDFG, of the form of the Security. The CPM may draw on the Security if the CPM determines the Project owner has failed to comply with the requirements specified in this condition. The CPM may use money from the Security solely for implementation of the requirements of this condition, The CPM's use of the Security to implement measures in this condition may not fully satisfy the Project owner's obligations under this condition. The Security shall be returned to the Project owner in whole or in part upon successful completion of the associated requirements in this condition.

Security shall be provided in the amount of $4,249,920, calculated as follows but adjusted as specified below:

i. land acquisition costs for compensation land, calculated at $500/acre = $932,000.

ii. initial protection and habitat improvement activities on the compensation land, calculated at $330/acre = $615,120.

iii. long-term maintenance and management on the compensation land calculated at $1,450/acre = $2,702,800.

The amount of security shall be adjusted for any change in the Project footprint as described above. In addition, the amount of Security specified in this section may be reduced in proportion to any of the secured mitigation requirements that the Project owner has completed at the time the Security is required to be submitted. For example, if the Project owner transfers funds for long-term management of the compensation lands to an entity approved to hold those funds, the Security would not include any amount for long-term maintenance and management of the lands. The Project owner will be entitled to partial or complete release of the Security as the secured mitigation requirements are successfully completed.

i. The Project owner may elect to comply with the requirements in this condition for acquisition of compensation lands, initial protection and habitat improvement on the compensation lands, or long-term maintenance and management of the compensation lands by funding, or any combination of these three requirements, by providing funds to implement those measures into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF). To use this option, the Project owner must make an initial deposit to the REAT Account in an amount equal to the estimated costs (as set forth in the Security section of this condition) of implementing the requirement. If the actual cost of the acquisition, initial protection and habitat improvements, or long-term funding is more than the estimated amount initially paid by the Project owner, the Project owner shall make an additional deposit into the REAT Account sufficient to cover the actual acquisition costs, the actual costs of initial protection and habitat improvement on the compensation lands, or the long-term funding requirements as established in an approved PAR or PAR-like analysis. If those actual costs or PAR projections are less than the amount initially transferred by the applicant, the remaining balance shall be returned to the Project owner.

The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat

conservation, by written agreement of the Energy Commission. Such delegation shall be subject to approval by the CPM, in consultation with CDFG, BLM and USFWS, prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of the Energy Commission's certification of the Project.

Verification: The Project owner shall provide the CPM with written notice at least 30 days prior to the start of ground-disturbing activities on the Project site.

If the mitigation actions required under this condition are not completed at least 30 days prior to the start of ground-disturbing activities, the Project owner shall provide the CPM with approved Security at least 30 days prior to the start of Project ground-disturbing activities

No later than 12 months after the start of ground-disturbing Project activities, the Project owner shall submit a formal acquisition proposal to the CPM describing the parcels intended for purchase, and shall obtain approval from the CPM, in consultation with CDFG, BLM and USFWS, prior to the acquisition. If NFWF or another approved third party is handling the acquisition, the Project owner shall fully cooperate with the third party to ensure the proposal is submitted within this time period. The Project owner or an approved third party shall complete the acquisition and all required transfers of the compensation lands, and provide written verification to the CPM, CDFG, BLM and USFWS of such completion, no later than 18 months after the start of Project ground-disturbing activities. If NFWF or another approved third party is being used for the acquisition, the Project owner shall ensure that funds needed to accomplish the acquisition are transferred in timely manner to facilitate the planned acquisition and to ensure the land can be acquired and transferred prior to the 18-month deadline,

The Project owner shall complete and submit to the CPM a PAR or PAR-like analysis no later than 60 days after the CPM approves compensation lands for acquisition. The Project owner shall fully fund the required amount for long-term maintenance and management of the compensation lands no later than 30 days after the CPM approves a PAR or PAR-like analysis of the anticipated long-term maintenance and management costs of the compensation lands. Written verification shall be provided to the CPM and CDFG to confirm payment of the long-term maintenance and management funds.

No later than 60 days after the CPM determines what activities are required to provide for initial protection and habitat improvement on the compensation lands, the Project owner shall make funding available for those activities and provide written verification to the CPM of what funds are available and how costs will be paid. Initial protection and habitat improvement activities on the compensation lands shall be completed, and written verification provided to the CPM, no later than six months after the CPM's determination of what activities are required on the compensation lands.

The Project owner, or an approved third party, shall provide the CPM, CDFG, BLM and USFWS with a management plan for the compensation lands within180 days of the land or easement purchase, as determined by the date on the title. The CPM, in consultation

with CDFG, BLM and the USFWS, shall approve the management plan after its content is acceptable to the CPM.

Within 90 days after completion of all project related ground disturbance, the Project owner shall provide to the CPM, CDFG, BLM and USFWS an analysis, based on aerial photography, with the final accounting of the amount of habitat disturbed during Project construction. This shall be the basis for the final number of acres required to be acquired.

RAVEN MANAGEMENT PLAN

BIO-13 The Project owner shall implement a raven monitoring and control plan that is consistent with the most current USFWS-approved raven management guidelines, and which meets the approval of the CPM, in consultation with USFWS. The draft Common Raven Monitoring, Management, and Control Plan (Raven Plan) submitted by the Applicant (TTEC 2010r) shall provide the basis for the final plan, subject to review and revisions and approval from the CPM and USFWS. The Raven Plan shall include but not be limited to a program to monitor increased raven presence in the Project vicinity and to implement raven control measures as needed based on that monitoring. The purpose of the plan is to avoid any Project-related increases in raven numbers during construction, operation, and decommissioning. The threshold for implementation of raven control measures shall be any increases in raven numbers from baseline conditions, as detected by monitoring proposed in the Raven Plan. In addition, to offset the cumulative contributions of the Project to desert tortoise from increased raven numbers, the Project owner shall also contribute to the USFWS Regional Raven Management Program. The Project owner shall do all of the following:

1. <u>Prepare and Implement a Raven Management Plan</u> that includes the following:

    a. Identify conditions associated with the Project that might provide raven subsidies or attractants;

    b. Describe management practices to avoid or minimize conditions that might increase raven numbers and predatory activities;

    c. Describe control practices for ravens;

    d. Address monitoring and nest removal during construction and for the life of the Project, and;

    e. Discuss reporting requirements.

2. <u>Contribute to the USFWS Regional Raven Management Program</u>. The project owner shall submit payment to the project sub-account of the REAT Account held by the National Fish and Wildlife Foundation (NFWF) to support the USFWS Regional Raven Management Program. The amount shall be a one-time payment of $105 per acre of permanent disturbance.

Verification: No less than 30 days prior to any construction-related ground disturbance activities, the Project owner shall provide the CPM, USFWS, and CDFG with the final version of a Raven Plan. All modifications to the approved Raven Plan shall be made only with approval of the CPM in consultation with USFWS and CDFG.

Within 30 days after completion of Project construction, the Project owner shall provide to the CPM for review and approval, a written report identifying which items of the Raven Plan have been completed, a summary of all modifications to mitigation measures made during the Project's construction phase, and which items are still outstanding.

On January 31st of each year following construction the Designated Biologist shall provide a report to the CPM that includes: a summary of the results of raven management and control activities for the year; a discussion of whether raven control and management goals for the year were met; and recommendations for raven management activities for the upcoming year.

WEED MANAGEMENT PLAN

BIO-14 The Project owner shall implement a Weed Management Plan that meets the approval of the CPM. The objective of the Weed Management Plan shall be to prevent the introduction of any new weeds and the spread of existing weeds as a result of Project construction, operation, and decommissioning. The draft Weed Management Plan submitted by the Applicant (TTEC 2009g) shall provide the basis for the final plan, subject to review and revisions from the CPM. The Final Weed Management Plan shall include at a minimum the following information: specific weed management objectives and measures for each target non-native weed species; baseline conditions; a map of the Weed Management Areas; weed risk assessment and measures to prevent the introduction and spread of weeds; monitoring and surveying methods; and reporting requirements.

To ensure that weed management does not have unintended adverse effects on special-status species, the final Weed Management Plan shall be revised to be consistent with guidelines for safe use of herbicides in natural areas provided by The Nature Conservancy's The Global Invasive Species Team: http://www.invasive.org/gist/products/library/herbsafe.pdf The final Plan shall include detailed specifications for avoiding herbicide and soil stabilizer drift, and shall include a list of herbicides and soil stabilizers that will be used on the Project with manufacturer's guidance on appropriate use. The Plan shall Indicate where the herbicides will be used, and what techniques will be used to avoid chemical drift or residual toxicity to special-status species and their pollinators, and consistent with the Nature Conservancy guidelines and the criteria under #2, below.

The final plan shall only include weed control measures for target weeds with a demonstrated record of success, based on the best available information from The Nature Conservancy's The Global Invasive Species

Team, California Invasive Plant Council: http://www.cal-ipc.org/ip/management/plant_profiles/index.php , and the California Department of Food & Agriculture Encycloweedia: http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_h p.htm. The methods shall meet the following criteria:

1. Manual: well-timed removal of plants or seed heads with hand tools; seed heads and plants must be disposed of in accordance with guidelines from the Riverside County Agricultural Commissioner.

2. Chemical: Herbicides known to have residual toxicity, such as pre-emergents and pellts, shall not be used in natural areas or within the engineered channels. Only the following application methods may be used: wick (wiping onto leaves); inner bark injection; cut stump; frill or hack & squirt (into cuts in the trunk); basal bark girdling; foliar spot spraying with backpack sprayers or pump sprayers at low pressure or with a shield attachment to control drift, and only on windless days, or with a squeeze bottle for small infestations (see Nature Conservancy guidelines described above);

3. Biological: Biological methods may be used subject to review and approval by CDFG and USFWS and only if approved for such use by CDFA, and are either locally native species or have no demonstrated threat of naturalizing or hybridizing with native species;

4. Mechanical: disking, tilling, and mechanical mowers or other heavy equipment shall not be employed in natural areas but hand weed trimmers (electric or gas-powered) may be used. Mechanical trimmers shall not be used during periods of high fire risk and shall only be used with implementation of fire prevention measures (GSEP 2009a).

Verification: No less than 10 days prior to start of any Project-related ground disturbance activities, the Project owner shall provide the CPM with the final version of a Weed Management Plan that has been reviewed and approved by Energy Commission staff, USFWS, and CDFG. Modifications to the approved Weed Control Plan shall be made only after consultation with the Energy Commission staff, USFWS, and CDFG.

Within 30 days after completion of Project construction, the Project owner shall provide to the CPM for review and approval, a written report identifying which items of the Weed Management Plan have been completed, a summary of all modifications to mitigation measures made during the Project's construction phase, and which items are still outstanding.

On January 31st of each year following construction the Designated Biologist shall provide a report to the CPM that includes: a summary of the results of noxious weeds surveys and management activities for the year; a discussion of whether weed management goals for the year were met; and recommendations for weed management activities for the upcoming year.

PRE-CONSTRUCTION NEST SURVEYS AND AVOIDANCE MEASURES

BIO-15 Pre-construction nest surveys shall be conducted if construction activities would occur at any time during the period of February 1 through July 31. The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors familiar with standard nest-locating techniques such as those described in Martin and Guepel (1993). The goal of the nesting surveys shall be to identify the general location of the nest sites, sufficient to establish a protective buffer zone around the potential nest site, and need not include identification of the precise nest locations. Surveyors performing nest surveys shall not concurrently be conducting desert tortoise surveys. The bird surveyors shall perform surveys in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat in the Project site or within 500 feet of the boundaries of the site (including linear facilities);

2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys shall be conducted within the 7-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed three weeks, an interval during which birds may establish a nesting territory and initiate egg laying and incubation;

3. If active nests are detected during the survey, a buffer zone and monitoring plan shall be developed. The size of the buffer zone shall be developed in consultation with CDFG and shall be determined based on the species specific alert distance and flush initiation distance[7]. Nest locations shall be mapped and submitted, along with a report stating the survey results, to the CPM; and

4. The Designated Biologist or Biological Monitor shall monitor the nest until he or she determines that nestlings have fledged and dispersed; activities that might, in the opinion of the Designated Biologist, disturb nesting activities, shall be prohibited within the buffer zone until such a determination is made.

Verification: At least 10 days prior to the start of any Project-related ground disturbance activities, the Project owner shall provide the CPM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor (s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest(s) that would be avoided during project construction.

[7] Alert distance refers to the distance between an animal and an activity when the animal becomes visibly alert (as evidenced by cessation of feeding and scrutiny of activity). Flush initiation distance, also called flight distance, refers to the distance between the animal and an activity when the animal takes flight (Taylor and Knight 2003).

No later than January 31st of every year following construction a follow-up report shall be provided to the CPM, CDFG, and USFWS describing the success of the buffer zones in preventing disturbance to nesting activity and a brief description of the outcome of the nesting effort (for example, whether young were successfully fledged from the nest or if the nest failed).

AVIAN PROTECTION PLAN

BIO-16 The Project owner shall prepare and implement an Avian Protection Plan to monitor death and injury of birds from collisions with facility features such as reflective mirror-like surfaces and from heat, and bright light from concentrating sunlight. The Project owner shall use the monitoring data to inform and develop an adaptive management program that would avoid and minimize Project-related avian impacts. Project-related bird deaths or injuries shall be reported to the CPM, CDFG and USFWS. The CPM, in consultation with CDFG and USFWS, shall determine if the Project-related bird deaths or injuries warrant implementation of adaptive management measures contained in the Avian Protection Plan. The study design for the Avian Protection Plan shall be approved by the CPM in consultation with CDFG and USFWS, and, once approved, shall be incorporated into the project's BRMIMP and implemented.

Verification: No less than 30 days prior to the start of construction-related ground disturbance activitiesthe Project owner shall submit to the CPM, USFWS and CDFG a final Avian Protection Plan. Modifications to the Avian Protection Plan shall be made only after approval from the CPM.

For one year following the beginning of power plant operation the Designated Biologist shall submit quarterly reports to the CPM, CDFG, and USFWS describing the dates, durations, and results of monitoring. The quarterly reports shall provide a detailed description of any Project-related bird deaths or injuries detected during the monitoring study or at any other time, and describe adaptive management measures implemented to avoid or minimize deaths or injuries. Following the completion of the fourth quarter of monitoring the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any Project-related bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed.

No later than January 31st of every year the Annual Report shall be provided to the CPM, CDFG, and USFWS. Quarterly reporting shall continue until the CPM, in consultation with CDFG and USFWS determine whether more years of monitoring are needed, and whether mitigation and adaptive management measures are necessary.After two years of data collection the project owner or contractor shall prepare a report that describes the study design and monitoring results of the Avian Protection Plan. The report shall be submitted to the CPM, CDFG and USFWS no later than the third year after onset of Project operation.

AMERICAN BADGER AND DESERT KIT FOX IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-17 To avoid direct impacts to American badgers and desert kit fox, pre-construction surveys shall be conducted for these species concurrent with the desert tortoise surveys. Surveys shall be conducted as described below:

Biological Monitors shall perform pre-construction surveys for badger and kit fox dens in the Project area, including areas within 250 feet of all Project facilities, utility corridors, and access roads. Surveys may be concurrent with desert tortoise surveys. If dens are detected each den shall be classified as inactive, potentially active, or definitely active.

Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox. Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand. If tracks are observed, and especially if high or low ambient temperatures could potentially result in harm to kit fox or badger from burrow exclusion, various passive hazing methods may be used to discourage occupants from continued use. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den. BLM approval may be required prior to release of badgers on public lands.

Verification: The Project owner shall submit a report to the CPM and CDFG within 30 days of completion of badger and kit fox surveys. The report shall describe survey methods, results, impact avoidance and minimization measures implemented, and the results of those measures.

BURROWING OWL IMPACT AVOIDANCE, MINIMIZATION, AND COMPENSATION MEASURES

BIO-18 The Project owner shall implement the following measures to avoid, minimize and offset impacts to burrowing owls:

1. Pre-Construction Surveys. The Designated Biologist or Biological Monitor shall conduct pre-construction surveys for burrowing owls no more than 30 days prior to initiation of construction activities. Surveys shall be focused exclusively on detecting burrowing owls, and shall be conducted from two hours before sunset to one hour after or from one hour before to two hours after sunrise. The survey area shall include the Project Disturbance Area and surrounding 500 foot survey buffer.

2. Implement Avoidance Measures. If an active burrowing owl burrow is detected within 500 feet from the Project Disturbance Area the following avoidance and minimization measures shall be implemented:

   a. Establish Non-Disturbance Buffer. Fencing shall be installed at a 250-foot radius from the occupied burrow to create a non-disturbance buffer around the burrow. The non-disturbance buffer and fence line may be reduced to 160 feet if all Project-related activities that might disturb burrowing owls would be conducted during the non-breeding season (September 1st through January 31st). Signs shall be posted in English and Spanish at the fence line indicating no entry or disturbance is permitted within the fenced buffer.

   b. Monitoring: If construction activities would occur within 500 feet of the occupied burrow during the nesting season (February 1 – August 31st) the Designated Biologist or Biological Monitor shall monitor to determine if these activities have potential to adversely affect nesting efforts, and shall implement measures to minimize or avoid such disturbance.

3. Relocation of Burrowing Owls. If pre-construction surveys indicate the presence of burrowing owls within the Project Disturbance Area (the Project Disturbance Area means all lands disturbed in the construction and operation of the Genesis Project), the Project owner shall prepare and implement a Burrowing Owl Relocation and Mitigation Plan, in addition to the avoidance measures described above. The final Burrowing Owl Relocation and Mitigation Plan shall be approved by the CPM, in consultation with USFWS, BLM and CDFG, and shall:

   a. Identify and describe suitable relocation sites within 1 mile of the Project Disturbance Area, and describe measures to ensure that burrow installation or improvements would not affect sensitive species habitat or existing burrowing owl colonies in the relocation area;

   b. Provide guidelines for creation or enhancement of at least two natural or artificial burrows per relocated owl, including a discussion of timing of burrow improvements, specific location of burrow installation, and burrow design. Design of the artificial burrows shall be consistent with CDFG guidelines (CDFG 1995) and shall be approved by the CPM in consultation with CDFG, BLM and USFWS;

   c. Provide detailed methods and guidance for passive relocation of burrowing owls occurring within the Project Disturbance Area; and

   d. Prepare a monitoring and management of the relocated burrowing owl site, and provide a reporting plan. The objective of the plan

shall be to manage the relocation area for the benefit of burrowing owls, with the specific goals of:

i. maintaining the functionality of the burrows

ii. Minimizing the occurrence of weeds (species considered "moderate" or "high" threat to California wildlands as defined by CAL-IPC [2006] and noxious weeds rated "A" or "B" by the California Department of Food and Agriculture and any federal-rated pest plants [CDFA 2009]) at less than 10 percent cover of the shrub and herb layers.

4. Acquire Compensatory Mitigation Lands for Burrowing Owls. The following measures for compensatory mitigation shall apply only if burrowing owls that are detected within the Project Disturbance Area. The Project owner shall acquire, in fee or in easement, 19.5 acres of land for each burrowing owl that is displaced by construction of the Project. Staff anticipates displacement of two owls for a total of 39 acres of compensatory mitigation land. The Project owner shall provide funding for the enhancement and long-term management of these compensation lands. The acquisition and management of the compensation lands may be delegated by written agreement to CDFG or to a third party, such as a non-governmental organization dedicated to habitat conservation, subject to approval by the CPM, in consultation with CDFG and USFWS prior to land acquisition or management activities. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat.

   a. Criteria for Burrowing Owl Mitigation Lands. The terms and conditions of this acquisition or easement shall be as described in Paragraph 1 of **BIO-12** [Desert Tortoise Compensatory Mitigation], with the additional criteria to include: 1) the 39 acres of mitigation land must provide suitable habitat for burrowing owls, and 2) the acquisition lands must either currently support burrowing owls or be within dispersal distance from an active burrowing owl nesting territory (generally approximately 5 miles). The 39 acres of burrowing owl mitigation lands may be included with the desert tortoise mitigation lands ONLY if these two burrowing owl criteria are met. If the 39 acre of burrowing owl mitigation land is separate from the acquisition required for desert tortoise compensation lands, the Project owner shall fulfill the requirements described below in this condition.

   b. Security. The Security measures described below is based on the assumption that two owls would be impacted by construction of the Project, and would therefore require 39 acres of compensatory mitigation land. If the 39 acres of burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands the Project owner or an approved third party

shall complete acquisition of the proposed compensation lands prior to initiating ground-disturbing Project activities. Alternatively, financial assurance can be provided by the Project owner to the CPM with copies of the document(s) to CDFG, BLM and the USFWS, to guarantee that an adequate level of funding is available to implement the mitigation measure described in this condition. These funds shall be used solely for implementation of the measures associated with the Project. Financial assurance can be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("Security") prior to initiating ground-disturbing Project activities. Prior to submittal to the CPM, the Security shall be approved by the CPM, in consultation with CDFG, BLM and the USFWS to ensure funding. As of the publication of the RSA, this amount is $44,460 but this amount may change based on land costs or the estimated costs of enhancement and endowment (see subsection C.2.4.2, Desert Tortoise, for a discussion of the assumptions used in calculating the Security, which are based on an estimate of $2,280 per acre to fund acquisition, enhancement, and long-term management). The final amount due will be determined by the PAR analysis conducted pursuant to **BIO-12**.

Verification: If pre-construction surveys detect burrowing owls within 500 feet of proposed construction activities, the Designated Biologist shall provide to the CPM, BLM, CDFG and USFWS documentation indicating that non-disturbance buffer fencing has been installed at least 10 days prior to the start of any construction-related ground disturbance activities. The Project owner shall report monthly to the CPM, CDFG, BLM and USFWS for the duration of construction on the implementation of burrowing owl avoidance and minimization measures. Within 30 days after completion of construction the Project owner shall provide to the CPM, BLM, CDFG and USFWS a written construction termination report identifying how mitigation measures described in the plan have been completed.

If pre-construction surveys detect burrowing owls within the Project Disturbance Area, the Project owner shall notifiy the CPM, BLM, CDFG and USFWS no less than 10 days of completing the surveys that a relocation of owls is necessary. The Project owner shall do all of the following if relocation of one or more burrowing owls is required:

a. Within 30 days of completion of the burrowing owl pre-construction surveys, submit to the CPM, CDFG and USFWS a Burrowing Owl Relocation and Mitigation Plan.

b. No less than 90 days prior to acquisition of the burrowing owl compensation lands, the Project owner, or an approved third party, shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the 39-acre parcel intended for purchase. At the same time the Project owner shall submit a PAR or PAR-like analysis for the parcels for review and approval by the CPM, CDFG and USFWS.

c. Within 90 days of the land or easement purchase, as determined by the date on the title, the Project owner shall provide the CPM with a management plan for review

and approval, in consultation with CDFG, BLM and USFWS, for the compensation lands and associated funds.

d. No later than 30 days prior to the start of construction-related ground disturbing activities, the Project owner shall provide written verification of Security in accordance with this condition of certification.

e. No later than 18 months after the start of construction-related ground disturbance activities, the Project owner shall provide written verification to the CPM, BLM, CDFG and USFWS that the compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient.

f. On January 31st of each year following construction for a period of five years, the Designated Biologist shall provide a report to the CPM, USFWS, BLM and CDFG that describes the results of monitoring and management of the burrowing owl relocation area. The annual report shall provide an assessment of the status of the relocation area with respect to burrow function and weed infestation, and shall include recommendations for actions the following year for maintaining the burrows as functional burrowing owl nesting sites and minimizing the occurrence of weeds.

SPECIAL-STATUS PLANT IMPACT AVOIDANCE, MINIMIZATION AND COMPENSATION

BIO-19 The Project owner shall implement the following measures to avoid, minimize, and mitigate impacts to special-status plant species:

Section A: Special-Status Plant Avoidance and Minimization Measures

To protect all special-status plants located within 100 feet of the permitted Project Disturbance Area (including access roads, staging areas, laydown areas, parking and storage areas) from accidental and indirect impacts during construction, operation, and closure, the Project owner shall implement the following measures:

1. Designated Botanist. An experienced botanist who meets the qualifications described in Section **B-2** below shall oversee compliance with all special-status plant avoidance, minimization, and compensation measures described in this condition throughout construction, operation, and closure. The Designated Botanist shall oversee and train all other Biological Monitors tasked with conducting botanical survey and monitoring work.

2. Special-Status Plant Impact Avoidance and Minimization Plan. The Project owner shall develop and implement a Special-Status Plant Impact Avoidance and Minimization Plan and shall incorporate the Plan into the BRIMP (**BIO-7**). The Plan shall include the following elements:

   a. Site Design Modifications: Incorporate site design modifications to minimize impacts to special-status plants along the Project linears: limiting the width of the work area; adjusting the location of staging areas, lay downs, spur roads and poles or towers; driving and crushing vegetation as an alternative to blading temporary roads to preserve the

seed bank, and minor adjustments to the alignment of the roads and pipelines within the constraints of the ROW. Modify the engineered channel discharge points to maintain the natural surface drainage patterns between the engineered channel and the outlet of the natural washes at Ford Dry Lake. These modifications shall be clearly depicted on the grading and construction plans, and on report-sized maps in the BRMIMP;

b. Establish Environmentally Sensitive Areas (ESAs). Before construction establish ESAs to protect avoided plants. The locations of ESAs shall be clearly depicted on construction drawings, which shall also include all avoidance and minimization measures on the margins of the construction plans. The boundaries of the ESAs shall be placed a minimum of 20 feet from the uphill side of the occurrence and 10 feet from the downhill side, and shall be clearly delineated in the field with temporary construction fencing and signs prohibiting movement of the fence under penalty of work stoppages and additional compensatory mitigation. ESAs shall also be permanently marked (with signage or other markers) to ensure that avoided plants are not inadvertently harmed during construction, operation, or closure.

c. Special-Status Plant Worker Environmental Awareness Program (WEAP). The Plan shall include training components specific to protection of special-status plants, and shall be incorporated into the WEAP described in **BIO-6**;

d. Herbicide and Soil Stabilizer Drift Control Measures. The Plan shall provide detailed specifications for avoiding herbicide and soil stabilizer drift, and shall include a list of herbicides and soil stabilizers that will be used on the Project with manufacturer's guidance on appropriate use. The Plan shall Indicate where the herbicides will be used, and what techniques will be used to avoid chemical drift or residual toxicity to special-status plants, consistent with guidelines provided by the Nature Conservancy's The Global Invasive Species Team <http://www.invasive.org/gist/products.html>

e. Erosion and Sediment Control Measures. The Plan shall include measures to ensure that erosion and sediment control measures do not inadvertently impact special-status plants (e.g., by using invasive or non-native plants in seed mixes, introducing pest plants through contaminated seed or straw, etc.). These measures shall be incorporated in the Storm Water Pollution Prevention Plan.

f. Avoid Special-Status Plant Occurrences. Designate spoil areas; equipment, vehicle, and materials storage areas; parking; equipment and vehicle maintenance areas, and; wash areas at least 100 feet from any ESAs.

g. Monitoring and Reporting Requirements. The Designated Botanist shall conduct weekly monitoring of the ESAs that protect special-status plant occurrences during construction, operation, or decommissioning activities within 100 feet of the occurrences, and quarterly monitoring for the remainder of construction. The Project owner shall also conduct annual monitoring of the avoided occurrences on-site, and off-site occurrences that are adjacent to the Project, for the life of the Project (see Verification, below).

h. Seed Collection. Conduct pre-construction collection of seed (or other propagules) of the affected special-status plants within the Project Disturbance Area in the summer-fall season prior to the start of construction and according to the seed collection and storage guidelines contained in (Wall 2009a; Bainbridge 2007). Collection of seed (or other propagules) shall be done by the Rancho Santa Ana Botanic Garden (RSABG) Conservation Program staff or other qualified seed or restoration specialist. The Project owner shall be responsible for all costs associated with seed storage All seed storage shall occur at RSABG or other qualified seed dealer and at least 40 percent of the collected seed shall remain in long-term storage at RSABG Seed Conservation Program, San Diego Natural History Museum, or other qualified seed conservation program, and made available for contingency efforts in the event of on-site or off-site mitigation failure.

Section B: Conduct Late-Season Botanical Surveys

The Project owner shall conduct late-summer/fall botanical surveys for late-season special-status plants as described below:

1. Survey Timing. Surveys shall be timed to detect: a) summer annuals triggered to germinate by the warm, tropical summer storms (which may occur any time between June and October), and b) fall-blooming perennials that respond to the cooler, later season storms that originate in the Pacific northwest (typically beginning in September or October). The surveys shall not be timed to coincide with the statistical peak bloom period of the target species but shall instead be based on plant phenology and the timing of a significant storm event (i.e., a 10mm or greater rain or storm event, as measured at or within 1 mile of the Project site). Surveys for summer annuals shall be timed to occur approximately 4 to 7 weeks following a warm, tropical storm. Re-surveys shall occur as many times as necessary to ensure that surveys are conducted during the appropriate identification period for the target taxa, which may be blooms, fruit, seed characteristics, or vegetative characteristics, depending on the taxon.

2. Surveyor Qualifications and Training. Surveys shall be conducted by a qualified botanist knowledgeable in the complex biology of the local flora, and consistent with CDFG protocols (CDFG 2009). The botanical survey crew shall be prepared to mobilize quickly to conduct appropriately timed surveys. Each surveyor shall be equipped with a GPS unit and record a

complete tracklog; these data shall be compiled and submitted along with the Summer-Fall Survey Botanical Report (described below). Prior to the start of surveys, all crew members shall, at a minimum, visit reference sites (where available) and/or review herbarium specimens of all BLM Sensitive plants, CNPS List 1B or 2 (Nature Serve rank S1 and S2) or proposed List 1B or 2 taxa (including Coachella Valley milk-vetch), and any new reported or documented taxa, to obtain a search image. Because range extensions are likely to be found, the list of potentially occurring special-status plants shall include all special-status taxa known to occur within the Sonoran Desert region and the eastern portion of the Mojave in California. The list shall also include taxa with bloom seasons that begin in fall and extend into the early spring as many of these are reported to be easier to detect in fall, following the start of the fall rains.

3. Survey Coverage. At a minimum, the Applicant shall conduct comprehensive surveys (i.e., 100 percent visual coverage) of the washes, playa margins, dune swales, and other lowlands within the Project Disturbance Area and downstream to the playa margin to capture the full extent of the washes that will be affected by diversions into the engineered channel. In the intervening uplands (dry areas), surveys shall be conducted to ensure a 25 percent visual coverage. Other special or unique habitats associated with rare plants (such as dunes, washes, and chenopod scrubs at the playa margin) shall also be surveyed at 100 percent visual coverage. Transects shall be “intuitive controlled” (per Whiteaker et al. 1998) to ensure a focus on habitat most likely to support rare plants (such as desert washes or dunes), rather than on pre-defined, evenly-spaced survey grids. In the one-mile CEC buffer areas (outside the Project Disturbance Area), washes, dunes, and other habitats strongly associated with rare plants shall also be surveyed comprehensively (i.e., 100 percent visual coverage) if they will be affected by diversions into the engineered channel but the intervening uplands or habitat not strongly associated with rare plants may be spot-checked or sampled at approximately 10 percent visual coverage.

4. Documenting Occurrences. If a special-status plant is detected, the full extent of the population shall be assessed, both onsite and offsite. The number of individuals shall be counted (or sub-sampled and the population size estimated in the event of large populations). The boundaries of all occurrences shall be recorded with hand-held GPS units of one meter or better accuracy and then plotted on aerial photo base maps of a scale similar to that used in the AFC (GSEP 2009a). All but the smallest populations (e.g., a population occupying less than 100 square feet) shall be recorded as area polygons; small populations may be recorded as point features. All GPS-recorded occurrences shall include: the number of plants, phenology, observed threats (e.g., OHV or invasive exotics), and habitat or community type. The map of occurrences submitted with the progress reports and final botanical report shall be prepared to ensure consistency with mapping protocol and definitions of occurrences in CNDDB: occurrences found within 0.25 miles of another

occurrence of the same taxon, and not separated by significant habitat discontinuities, shall be combined into a single 'occurrence'. The Project Owner shall also submit the raw GPS shape files and metadata.

5. Reporting. Progress Reports shall be submitted during surveys (as described below in verification), and shall include: a) the raw GPS data and metadata; b) a spreadsheet of the data (from the 'dbf' file), and c) a map of the data showing occurrence locations (labeled with their corresponding occurrence number from the GPS files) and Project features on a USGS topographic base map.

   The Final Summer-Fall Botanical Survey Report shall be prepared consistent with CDFG guidelines (CDFG 2009), and BLM guidelines (Lund pers comm) and shall include the following components:

   a. the BLM designation, NatureServe Global and State Rank of each species or taxon found (or proposed rank, or CNPS List);

   b. the number or percent of the occurrence that will be directly affected, and indirectly affected by changes in drainage patterns or altered geomorphic processes;

   c. the habitat or plant community that supports the occurrence and the total acres of that habitat or community type that occurs in the Project Disturbance Area;

   d. an indication of whether the occurrence has any local or regional significance (e.g., if it exhibits any unusual morphology, occurs at the periphery of its range in California, represents a significant range extension or disjunct occurrence, or occurs in an atypical habitat or substrate);

   e. a completed CNDDB field form for every occurrence, and;

   f. two maps: one that depicts the raw GPS data (as collected in the field) on a topographic base map with Project features; and a second map that follows the CNDDB protocol for occurrence mapping, which lumps two or more occurrences of the same species within one-quarter mile or less of each other into one occurrence.

Section C: Triggers for Implementation of Mitigation for Special-Status Plants Detected in the Summer/Fall 2010 Surveys

The standards listed below establish criteria that would trigger implementation of additional mitigation measures for impacts to late summer/fall season special status plant species (if detected during the surveys required under Section B of this Condition). These mitigation measures, described in Section D below, would reduce impacts to any special-status plant species detected during the late summer/fall plant surveys to less than significant levels. These rankings are based on the internationally accepted Natural Heritage Methodology, available online at:

http://www.natureserve.org/prodServices/heritagemethodology.jsp Included in this methodology is the NatureServe global and state ranking process (www.natureserve.org/explorer/ranking) which provides an estimate of extinction risk worldwide and in California (Master et al. 2009). Avoidance and Minimization Measures described in Section A of this condition are required for all special-status plants, regardless of NatureServe rank or CNPS List.

1. Triggers. The following triggers for implementation of mitigation are not intended for use beyond their use in the application of this Condition (Subsection C):

   a. Level 1 Trigger. BLM requests 100 percent avoidance for BLM Sensitive species (most G1 or G2 species are BLM Sensitive) but BLM's State Botanist will decide the level of avoidance on a case-by-case basis. Any impacts to non-BLM Sensitive species with a NatureServe Global Rank of G1 or G2 will trigger mitigation as described in Section D below.

   b. Level 2 Trigger. Any impact to a taxon with a NatureServe Global Rank of G3 or G4 and a CNDDB State Rank of S1 or S2 will trigger mitigation described in Section D below. Off-site mitigation shall be required as described in Section D, below, for impacts to greater than 25 percent of the total population of a G3 or G4 taxa with a state rank of S1 or S2.

   c. Level 3 Trigger. If the project would impact more than 30 percent of the total known and documented occurrences of a taxon with a NatureServe Global Rank of G3, G4, or G5 and a CNDDB State Rank of S3, off-site mitigation shall be required, as described in Section D below.

2. Adjustments for Triggers. The levels of protection for a taxon may be adjusted under the following scenarios:

   a. State- or Federal-Listed Species. If a state or federal-listed species is detected, the Project owner shall immediately notify the CDFG, USFWS, and the CPM, and comply with all measures contained in this condition as well as the terms and conditions of any applicable federal permit, including avoidance and reconfiguration if required.

   b. Local or Regional Significance. CNPS List 4 (typically assigned a State rank of 3) shall be adjusted to a higher level of protection if the plant occurrence has local or regional significance not captured by the above rankings. According to CDFG protocol (CDFG 2009): "List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity shall be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. CNPS List 3 and 4 may be considered regionally significant if, e.g., the occurrence is located at

the periphery of the species' range, or exhibits unusual morphology, or occurs in an unusual habitat/substrate."

A plant occurrence of any rank may be assigned a five percent higher level of protection in its ranking if the plant occurrence exhibits one or more of the following features:

i. occurs at the outermost periphery of its range in California;

ii. represents a significant range extension or disjunct occurrence (e.g., is located outside of the 9-quad region centered on the nearest known occurrence);

iii. is in an atypical habitat, region, or elevation for the taxon that suggests that the occurrence may have genetic significance (e.g., that may increase its ability to survive future threats), or;

iv. exhibits any unusual morphology that is not clearly attributable to environmental factors that may indicate a potential new variety or sub-species.

c. Significant Cumulative Effects. The assessment of known threats from over 50 sources are considered and reflected in the CNDDB threat rank, including renewable energy (see http://www.natureserve.org/publications/ConsStatusAssess_StatusFactors.pdf , "Threats").

d. Ownership/Management Threats. The degree to which a taxon's occurrences are adequately protected and managed is not included in the set of core factors used for NatureServe rankings that pre-date the 2009 revised protocols (Master et al. 2009). The threats to special-status plants with many occurrences on private lands without conservation easements, or on BLM lands managed for multiple uses (outside of a DWMA) will be captured in the new rankings available in summer 2010.

e. New, Un-Described Taxa and Other Occurrences of Questionable Taxonomic Status. BLM will treat new un-described taxa as if they are BLM Sensitive, and requests 100 percent avoidance, but BLM's State Botanist will decide the level of avoidance on a case-by-case basis. Proposed additions to the CNPS Inventory, including any new un-described taxa that are proposed additions to the CNPS Inventory, will be treated as Proposed unless rejected by the CNPS Rare Plant Botanist after the initial literature review and consultation with the network of botanists, representing state and federal agencies, consulting firms, and academic institutions. A description of the peer review process is available at: http://www.cnps.org/cnps/rareplants/. Typically, under NatureServe and CNPS ranking protocol, plants with a questionable taxonomy are assigned a lower conservation priority with

the caveat that resolution of this uncertainty may result in a status change that may be lower or higher than originally assigned.

3. Basis for Assessing Total Documented Occurrences. The accounting or inventory of the species' total known or documented occurrences shall be based on the following sources: CNDDB processed and unprocessed data; California Consortium of Herbaria and other herbaria records; BLM records; survey data from other renewable energy projects and other related projects for which survey data is available; and reported occurrences by qualified botanists accompanied by a completed CNDDB or similar field form (with or without voucher specimens). Data considered unreliable include: range implied in literature but without collection numbers or specific location information and anecdotal reports without documentation or from non-credible sources. Occurrences based on historic (pre-CEQA, or pre-1972) collections that have not since been verified will not be considered unless verified and documented by one of the sources described above.

Section D: Mitigation Measures for Special-Status Plants

Special-Status Plant Mitigation Plan. Upon completion of the summer-fall 2010 surveys, (see Section B of this Condition), the Project owner shall prepare a Special-Status Plant Mitigation Plan that includes all of the mitigation requirements described in the special-status plant impact analysis of this Revised Staff Assessment (see Section C.2.4.2) for: Harwood's eriastrum; Harwood's milk-vetch; desert unicorn plant, and ribbed cryptantha. The Plan shall also include the mitigation requirements for any additional special-status plants found during the summer-fall 2010 surveys (see Sections B and C of this Condition) in accordance with the mitigation triggers described above (Section C of this condition) and that meet the performance standards specified below. Avoidance and Minimization Measures described in Section A of this condition are required for all special-status plants, regardless of NatureServe rank or CNPS List.

1. On-Site Avoidance. BLM requests 100 percent avoidance for BLM Sensitive species but BLM's State Botanist will decide the level of avoidance on a case-by-case basis. On-site avoidance shall also be required if the impact to a special-status species with a NatureServe Global Rank of G1 or G2 exceeds 10 percent of the species' known and documented occurrences (see 'Level 1 Trigger', Section C of this Condition). Under this scenario, the Project owner shall be required to avoid a minimum of 75 percent of the total population. For perennial taxa the percent avoidance shall be measured based on the percentage of the total individuals affected; for annuals the percent avoidance shall be measured based on the total area occupied by the occurrence plus any additional habitat deemed essential for maintaining healthy, reproductive populations (BLM CDD 2002). The Project owner shall implement all measures described in Section A of this Condition to protect the avoided occurrence from accidental direct and indirect effects during construction, operation, and closure.

2. Off-Site Compensatory Mitigation. One or more of the following options for mitigation may be used to reduce Level 2 and Level 3 impacts to special-status plants (see Section C of this Condition) to less than significant levels:

   a. Acquire Off-Site Compensatory Land. To fully mitigate for the loss of special-status plants, the Project owner shall provide compensatory mitigation by acquiring, in fee title or conservation easement, lands meeting the specific criteria outlined in D-3 below, and in an amount equal to the amount of occupied special-status plant habitat disturbed by the final Project footprint. The Project footprint means all lands disturbed in the construction and operation of the Project, including all Project linears. To satisfy this condition, the Project owner shall also provide associated funding for the acquired lands, as specified in **BIO-12** Section A.

   b. Habitat Enhancement. Implement a Habitat Enhancement Project for the rescue of an off-site occurrence that is currently assessed with a long-term decline, with an immediate threat, or an overall threat impact that is High to Very High (see NatureServe Threat Ranking system, at http://www.natureserve.org/publications/ConsStatusAssess_StatusFactors.pdf , "Threats").

   c. Third Party. The responsibilities for implementation of an approved Habitat Enhancement Plan may be delegated by written agreement of the Energy Commission in consultation to the NFWF or other qualified land trust or public resource agency responsible for managing lands containing the site of the enhancement project. The Project owner shall deposit into the NFWF account an amount equivalent to the cost of implementing the enhancement project, subject to approval by the CPM. This Habitat Enhancement option may be implemented on public lands protected under a designation that assures management for the benefit of species and the enhancement lands, or on private lands protected in perpetuity under a conservation easement.

3. Criteria for Compensatory Acquisition Lands. If this option is selected to meet the mitigation obligations, the Project owner shall acquire, in fee title or conservation easement, lands that meet the criteria below. The responsibilities for acquisition and management of the compensation lands may be delegated by written agreement to a qualified third party, such as a non-governmental organization dedicated to habitat conservation. Additional funds shall be provided for basic long-term stewardship of the conservation easement. At a minimum, long-term management shall consist of the activities described in Land Trust Standards and Practices (Land Trust Alliance 2004, Practice 12A) http://www.landtrustalliance.org/learning/sp/land-trust-standards-and-practices for start-up and annual management activities, including preparation of a long-term management and monitoring plan. The amount of the long-term management and maintenance fund shall be based on PAR or PAR-like analysis. The terms and conditions for acquisition shall

be as described in **BIO-12**. The acquisition lands must be within California, and must meet one or more of the following additional requirements:

a. Occupied and with good to excellent site integrity. Contains an occurrence of the target special-status plant. The occurrence may be smaller than the affected occurrence but must be a viable reproducing occurrence, stable or increasing (in size and reproduction), with good or better habitat quality than the affected occurrence, and with a reasonable expectation of long-term sustainability. The amount of land to be acquired shall be equivalent to the total acres of the affected occupied habitat mitigated at a ratio of 3:1 (3 acres acquired for every one acre of occupied habitat affected).

b. Occupied but with threats to habitat quality and accompanied by an approved restoration plan. The occurrence or the site may contain threats to its integrity as long as the population or the site can be reasonably expected to recover with minor restoration (e.g., barricading ORV, excluding grazing, or minor pest plant removal) and is accompanied by a restoration plan that meets the minimum standards described in **D-5** below. The amount of land to be acquired shall be equivalent to the total acres of affected occupied habitat mitigated at a ratio of 3:1 (3 acres acquired for every one acre of occupied habitat affected), with the additional expense of preparing and implementing an approved habitat restoration plan, including long-term monitoring. The restoration plan shall be prepared in accordance with all guidelines described below.

c. Unoccupied but adjacent to occupied habitat. The acquired habitat may be unoccupied but it improves the defensibility and long-term sustainability of the occupied habitat by expanding the buffer of protection around the occurrence so as to prevent future development of adjacent habitat and protect its connectivity to undisturbed habitat. Buffer lands may or may not be dominated by the same habitats that support the special-status plants but must provide some habitat continuity between the occupied habitat and undisturbed habitats of a high integrity beyond the buffer lands. Habitat integrity, connectivity, defensibility, and potential threats shall also be addressed in the proposal. The amount of land to be acquired shall be equivalent to the total acres of affected occupied habitat mitigated at a ratio of 4:1 (4 acres acquired for every one acre of occupied habitat affected).

d. Unoccupied and not adjacent to occupied habitat. Must contain high-quality habitat that is critical to the maintenance or sustainability of the affected species and represent a potential reserve in the future (for either natural colonization or artificial). Good to high quality dune or playa margin habitat, sandy washes, or sand fields within Chuckwalla Valley, would be an example of acquisition not adjacent and not currently occupied but may be an important site for natural or artificial establishment of Harwood's milk-vetch and other rare plants of dune

and sandy habitats in Chuckwalla Valley. Acquired lands may also focus on linkages for species dispersal between major populations and refugia at higher elevations/more mesic habitats to accomodate species migration with future climate change. Habitat integrity, connectivity, defensibility, and potential threats shall also be addressed in the proposal. The amount of land to be acquired shall be equivalent to the total acres of affected occupied habitat mitigated at a ratio of 5:1 (5 acres acquired for every one acre of occupied habitat affected).

If all or any portion of the acquired Desert Tortoise, Mojave Fringe-toed Lizard, Dunes, Waters of the State or other required compensation lands meets the criteria above for special-status plant compensation lands, the portion of the other species' or habitat compensation lands that meets any of the criteria above may be used to fulfill that portion of the obligation for special-status plant mitigation.

4. Habitat Enhancement. As an alternative to acquisition, and subject to approval by the CPM, the Project owner may prepare and implement a Habitat Enhancement Plan that meets the following performance standards:

   a. The proposed habitat enhancement project must achieve the rescue of an off-site occurrence that is currently assessed with: a long-term decline >30%, or; an immediate threat that affects >30% of the population, or; has an overall threat impact that is High to Very High (see NatureServe Threat Ranking system, at: http://www.natureserve.org/publications/ConsStatusAssess_StatusFactors.pdf , "Threats").

   b. The proposed enhancement must achieve an improvement in the occurrence trend to "stable" or "increasing" status, or downgrading of the overall threat rank to slight or low (from "High" to "Very High").

   c. Enhancement projects may include one or more of the following types of projects: i) control unauthorized vehicle use into an occurrence (or pedestrian use if clearly damaging to the species); ii) control noxious weeds that infest or pose an immediate threat to an occurrence; iii) exclude grazing by wild burros or livestock from an occurrence; or iv) restore lost or degraded hydrologic or geomorphic functions critical to the species by restoring previously diverted flows, removing obstructions to the wind sand transport corridor above an occurrence, or increasing groundwater availability for dependent species.

   d. Other types of enhancement projects may be considered if they meet the performance standard described above. The Project owner may elect to implement the enhancement, subject to approval by the CPM. Any enhancement mitigation proposal shall be accompanied by a detailed habitat restoration and/or enhancement plan prepared in accordance with the guidelines below.

e. In the event of failure to achieve the restoration or enhancement goals by the end of monitoring, the Project owner shall pay an amount equal to the cost of acquiring an equal number of acres of affected habitat, at a mitigation ratio of 3:1. The Habitat Enhancement Plan, subject to approval by the CPM, shall be prepared in accordance with all guidelines contained below **D-5**.

5. Guidelines for the Preparation of Habitat Enhancement/Restoration Plans. If the Habitat Enhancement option is selected (according to the criteria under **D-4**, above), the Project owner shall submit a detailed Habitat Enhancement or Restoration Plan that includes all of the following components and according to the guidelines in (a) through (j) below:

   a. Define the goals of the restoration or enhancement project and a measurable course of action developed to achieve those goals. The goals and objectives must meet the performance standard described in **D-4**, above;

   b. Estimate the pre-impact or historical conditions (before the site was degraded by weeds or grazing or ORV, etc.), and the desired conditions;

   c. Describe other site characteristics relevant to the restoration or enhancement project (e.g., composition of native and pest plants, topography and drainage patterns, soil types, geomorphic and hydrologic processes important to the site or species;

   d. Describe other important ecological factors of the species being protected, restored, or enhanced such as total population, reproduction, distribution, pollinators, etc.;

   e. Describe the restoration methods that will be used (e.g., invasive exotics control, site protection, seedling protection, propagation techniques, etc.) and the long-term maintenance required. The implementation phase of the enhancement must be completed within five years;

   f. Provide a detailed budget and time-line, develop clear, measurable, objective-driven annual success criteria;

   g. Develop clear, measurable monitoring methods that can be used to evaluate the effectiveness of the restoration and the benefit to the affected species. The Plan shall include a minimum of five years of quarterly monitoring and annual monitoring for the remainder of the life of the Project. At a minimum the progress reports shall include: quantitative measurements of the projects progress in meeting the enhancement project success criteria, detailed description of remedial actions taken or proposed, and contact information for the responsible parties.

h. Ensure accountability with a reporting program that includes progress toward goals and success criteria. Include names of responsible parties.

i. Describe the contingency plan for failure to meet annual goals.

j. Include proof of long-term protection for the restoration site. For private lands this would include conservations easements or other deed restrictions; projects on public lands must be contained in a DWMA, WHMA, or other land use protections that will protect the mitigation site and target species.

Mitigation Security. The Project owner shall provide financial assurances to the CPM, to guarantee that an adequate level of funding is available to implement the mitigation measures described above. These funds shall be used solely for implementation of the measures associated with the Project in the event the Project owner fails to comply with the requirements specified in this condition. The CPM's use of the security to implement measures in this condition may not fully satisfy the Project owner's obligations under this condition. Financial assurance can be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account, or another form of security ("Security") prior to initiating ground-disturbing Project activities. Prior to submittal to the CPM, the Security shall be approved by the CPM, in consultation with BLM, to ensure funding. The amount of the security shall be determined according to the mitigation ratios described in **D-3** (a) through (d) and **D-4** of this condition. The amount of security shall be adjusted for any change in the Project footprint as described above.

In lieu of acquiring lands or undertaking the habitat enhancements itself, the Project owner may satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as described in Section A.3(i) in Condition of Certification **BIO-12**. Condition of Certification **BIO-29** may provide the Project owner with another option for satisfying some or all of the requirements in this condition.
The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a qualified land trust or other non-governmental organization supportive of habitat conservation, by written agreement of the Energy Commission. Such delegation shall be subject to approval by the CPM in consultation with BLM prior to land acquisition, enhancement, or management activities.

Verification: Progress reports for the late summer/fall botanical surveys shall be submitted to the CPM and BLM's State Botanist on September 30, 2010 and October 30, 2010. The Final Summer-Fall Botanical Survey Report, GIS shape files and metadata shall be submitted to the BLM State Botanist and the CPM no less than 30 days prior to the start of ground-disturbing activities.

No less than 30 days prior to the start of ground-disturbing activities the Project owner shall submit grading plans and construction drawings depicting the location of Environmentally Sensitive Areas and the Avoidance and Minimization Measures contained in Section A of this Condition.

No less than 30 days prior to ground-disturbing activities the Project owner shall submit to the CPM for review and approval, in consultation with the BLM State Botanist, a draft Special-Status Plant Mitigation Plan. If state or federal listed plants are potentially affected, the Project owner shall also submit the Special-Status Plant Mitigation Plan to CDFG and USFWS. The Plan shall contain, at a minimum, a conceptual proposal for compensatory mitigation through acquisition or restoration (habitat enhancement), or both. If the habitat enhancement option is selected, the Project owner shall also submit a conceptual Habitat Enhancement Plan that includes all of the components described in Section D-5 of this condition. If avoidance is mandatory (in accordance with Section C-1 and D-1 of this condition) the draft Plan shall include grading plans and other relevant construction drawings clearly depicting the location of the avoided plants.

Within 90 days after completion of Project construction, the Project owner shall provide to the CPM an analysis with the final accounting, based on GIS analysis of post-construction aerial photography, of the amount of special-status plants and their habitat disturbed during Project construction. This shall be the basis for the final number of acres of habitat required for acquisition, as described in Section C.

The Project owner may elect to fund the acquisition and initial improvement of compensation lands through NFWF by depositing funds for that purpose into NFWF's REAT Account Payment of the initial funds for acquisition and initial improvement must be made at least 30 days prior to the start of ground-disturbing activities.

No fewer than 90 days prior to acquisition of the property, the Project owner shall submit a formal acquisition proposal to the CPM, CDFG, USFWS, and BLM describing the parcels intended for purchase and shall obtain approval from the CPM and CDFG prior to the acquisition. The PAR Analysis shall be completed no later than 18 months of the start of ground-disturbing activities, after which the amount will be adjusted.

If habitat enhancement is proposed, the final Habitat Enhancement Plan, prepared in accordance with Section D-5 shall be submitted to the CPM for review and approval no later than six months following the start of ground-disturbing activities. If acquisition is proposed, the Project owner shall submit to the CPM for review and approval, in consultation with the BLM State Botanist, a final Special-Status Plant Mitigation Plan for proposed acquisition lands no later than 18 months from the start of ground-disturbing activities.

Habitat Enhancement (if selected) shall be initiated no later than 12 months from the start of construction. The implementation phase of the enhancement project shall be completed within five years of initiation. Until completion of the five-year implementation portion of the enhancement action, a report shall be prepared and submitted as part of the Annual Compliance Report. This report shall provide, at a minimum: a summary of activities for the preceding year and a summary of activities for the following year; quantitative measurements of the Project's progress in meeting the enhancement

project success criteria; detailed description of remedial actions taken or proposed; and contact information for the responsible parties.

Implementation of the special-status plant impact avoidance and minimization measures shall be reported in the Monthly Compliance Reports prepared by the Designated Botanist. Within 30 days after completion of Project construction, the Project owner shall provide to the CPM, for review and approval in consultation with the BLM State Botanist, a written construction termination report identifying how measures have been completed.

The Project owner shall submit a monitoring report every year for the life of the project to monitor effectiveness of protection measures for all avoided special-status plants to the CPM and BLM State Botanist. The monitoring report shall include: dates of worker awareness training sessions and attendees, an inventory of the special-status plant occurrences and description of the habitat conditions, an indication of population and habitat quality trends, and description of the remedial action, if warranted and planned for the upcoming year.

SAND DUNES/MOJAVE FRINGE-TOED LIZARD MITIGATION

BIO-20 The Project owner shall mitigate for direct and indirect impacts to stabilized and partially stabilized sand dunes and other Mojave fringe-toed lizard habitat by acquisition of 190 acres of Mojave fringe-toed lizard habitat. The Project owner shall provide funding for the acquisition, initial habitat improvements and long-term management of the compensation lands. The 190-acre acquisition requirement, and associated funding requirements based on that acreage, will be adjusted if there are changes in the final footprint of the Project. In lieu of acquiring lands itself, the Project owner may satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as described in Section 3.i. of Condition of Certification **BIO-12.** Condition of Certification **BIO-29** may provide the Project owner with another option for satisfying some or all of the requirements in this condition.

The requirements for acquisition, initial improvement and long-term management of compensation lands include all of the following:

1. Criteria for Compensation Lands: The compensation lands selected for acquisition shall:

    a. Provide suitable habitat for Mojave fringe-toed lizards, and may include stabilized and partially stabilized desert dunes or sand drifts over playas or Sonoran creosote bush scrub;

    b. Be within the Chuckwalla Valley with potential to contribute to Mojave fringe-toed lizard habitat connectivity and build linkages between known populations of Mojave fringe-toed lizards and preserve lands with suitable habitat;

c. Be connected to lands that are either currently occupied or have high potential to be occupied by Mojave fringe-toed lizard based on patch size and habitat quality;

d. Be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;

e. Not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible;

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

g. Not contain hazardous wastes;

h. Not be subject to property constraints (i.e. mineral leases, cultural resources); and

i. Be on land for which long-term management is feasible.

2. Security for Implementation of Mitigation: The Project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding is available to implement the acquisitions and enhancement of Mojave fringe-toed lizard habitat as described in this condition. These funds shall be used solely for implementation of the measures associated with the Project. Financial assurance can be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or Security prior to initiating ground-disturbing project activities. The Security shall be approved by the CPM, in consultation with CDFG and the USFWS, to ensure sufficient funding. As of the publication of the RSA, this amount is $433,200. This amount may change based on land costs or the estimated costs of enhancement and endowment (see subsection C.2.4.2, Desert Tortoise, for a discussion of the assumptions used in calculating the Security, which are based on an estimate of $1,450 per acre to fund acquisition, enhancement and long-term management).

3. Preparation of Management Plan: The Project owner shall submit to the CPM, CDFG and USFWS a draft Management Plan that reflects site-specific enhancement measures for the Mojave fringe-toed lizard habitat on the acquired compensation lands. The objective of the Management Plan shall be to enhance the value of the compensation lands for Mojave fringe-toed lizards, and may include enhancement actions such as weed control, fencing to exclude livestock, erosion control, or protection of sand sources or sand transport corridors. A final Management Plan, approved by the CPM, shall be incorporated into the BRMIMP.

Verification: No later than 30 days prior to beginning construction-related ground-disturbing activities, the Project owner shall provide written verification of Security in accordance with this condition of certification. The Project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of construction-related ground-disturbing activities.

The Project owner, or an approved third party, shall provide the CPM, CDFG and USFWS with a management plan for the compensation lands and associated funds within 180 days of the land or easement purchase, as determined by the date on the title. The CPM shall review and approve the management plan, in consultation with CDFG and the USFWS.

No less than 90 days prior to acquisition of the property, the Project owner shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the parcels intended for purchase. At the same time the project owner shall submit a PAR or PAR-like analysis for the parcels for review and approval by the CPM, in consultation with BLM, CDFG and USFWS.

Within 90 days after completion of Project construction, the Project owner shall provide to the CPM and CDFG an analysis with the final accounting of the amount of Mojave fringe-toed lizard habitat disturbed during Project construction.

The Project owner shall provide written verification to the CPM, USFWS and CDFG that the compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient no later than 18 months after the initiation of construction related ground-disturbance activities.

EVAPORATION POND NETTING AND MONITORING

BIO-21 The Project owner shall cover the evaporation ponds prior to any discharge with 1.5-inch mesh netting designed to exclude birds and other wildlife from drinking or landing on the water of the ponds. Netting with mesh sizes other than 1.5-inches may be installed if approved by the CPM in consultation with CDFG and USFWS. The netted ponds shall be monitored regularly to verify that the netting remains intact, is fulfilling its function in excluding birds and other wildlife from the ponds, and does not pose an entanglement threat to birds and other wildlife. The ponds shall include a visual deterrent in addition to the netting, and the pond shall be designed such that the netting shall never contact the water. Monitoring of the evaporation ponds shall include the following:

1. Monthly Monitoring. The Designated Biologist or Biological Monitor shall regularly survey the ponds at least once per month starting with the first month of operation of the evaporation ponds. The purpose of the surveys shall be to determine if the netted ponds are effective in excluding birds, if the nets pose an entrapment hazard to birds and wildlife, and to assess the structural integrity of the nets. The monthly survey shall be conducted in one day for a minimum of two hours following sunrise (i.e., dawn), a minimum of one hour mid-day (i.e.,

1100 to 1300), and a minimum of two hours preceding sunset (i.e., dusk) in order to provide an accurate assessment of bird and wildlife use of the ponds during all seasons. Surveyors shall be experienced with bird identification and survey techniques. Operations staff at the Project site shall also report finding any dead birds or other wildlife at the evaporation ponds to the Designated Biologist within one day of the detection of the carcass. The Designated Biologists shall report any bird or other wildlife deaths or entanglements within two days of the discovery to the CPM, CDFG, and USFWS.

2. Dead or Entangled Birds. If dead or entangled birds are detected, the Designated Biologist shall take immediate action to correct the source of mortality or entanglement. The Designated Biologist shall make immediate efforts to contact and consult the CPM, CDFG, and USFWS by phone and electronic communications prior to taking remedial action upon detection of the problem, but the inability to reach these parties shall not delay taking action that would, in the judgment of the Designated Biologist, prevent further mortality of birds or other wildlife at the evaporation ponds.

3. Quarterly Monitoring. If after 12 consecutive monthly site visits no bird or wildlife deaths or entanglements are detected at the evaporation ponds by or reported to the Designated Biologist, monitoring, as described in paragraph 1, can be conducted on a quarterly basis.

4. Biannual Monitoring. If after 12 consecutive quarterly site visits no bird or wildlife deaths or entanglements are detected by or reported to the Designated Biologist and with approval from the CPM, USFWS and CDFG, future surveys may be reduced to two surveys per years, during the spring nesting season and during fall migration. If approved by the CPM, USFWS and CDFG, monitoring outside the nesting season may be conducted by the Environmental Compliance Manager.

5. Modification of Monitoring Program. CDFG or USFWS may submit a request for modifications to the evaporation pond monitoring program based on information acquired during monitoring, and may also suggest adaptive management measures to remedy any problems that are detected during monitoring or modifications if bird impacts are not observed. Modifications to the evaporation pond monitoring described above and implementation of adaptive management measures shall be made only after approval from the CPM, in consultation with USFWS and CDFG.

Verification: No less than 30 days prior to operation of the evaporation ponds the project owner shall provide to the CPM as-built drawings and photographs of the ponds indicating that the bird exclusion netting has been installed. For the first year of operation the Designated Biologist shall submit quarterly reports to the CPM, CDFG, and USFWS describing the dates, durations and results of site visits conducted at the evaporation ponds. Thereafter the Designated Biologist shall submit annual monitoring reports with this information. The quarterly and annual reports shall fully describe any

bird or wildlife death or entanglements detected during the site visits or at any other time, and shall describe actions taken to remedy these problems. The annual report shall be submitted to the CPM, CDFG, and USFWS no later than January 31st of every year for the life of the project.

MITIGATION FOR IMPACTS TO STATE WATERS

BIO-22 The Project owner shall implement the following measures to avoid, minimize and mitigate for direct and indirect impacts to waters of the state and to satisfy requirements of California Fish and Game Code sections 1600 and 1607.

1. Acquire Off-Site State Waters: The Project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes at least 132 acres of state jurisdictional waters, or the area of state waters directly or indirectly impacted by the final Project footprint. The Project footprint means all lands disturbed by construction and operation of the Genesis Project, including all Project linears. The parcel or parcels comprising the 132 acres of ephemeral washes shall include at least 48 acres of microphyll woodland. If the Reduced Acreage Alternative were constructed the mitigation requirements for impacts to state waters would be a minimum of 109 acres that included at least 48 acres of microphyll woodland. The terms and conditions of this acquisition or easement shall be as described in Condition of Certification **BIO-12**, #2 and #3. Mitigation for impacts to state waters shall occur within the Chuckwalla-Ford Dry Lake or surrounding watersheds, as close to the Project site as possible. The 132-acre acquisition of state waters may be integrated with the desert tortoise mitigation acquisition if the criteria described in this condition are met.

2. Security for Implementation of Mitigation: The Project owner shall provide financial assurances to the CPM and CDFG to guarantee that an adequate level of funding is available to implement the acquisitions and enhancement of state waters as described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Financial assurance can be provided to the CPM and CDFG in the form of an irrevocable letter of credit, a pledged savings account or Security prior to initiating construction-related ground disturbing activities. Prior to submittal to the CPM, the Security shall be approved by the CPM, in consultation with CDFG and the USFWS, to ensure sufficient funding. As of the publication of the RSA, this amount is $300,960. These amounts may change based on changes in land costs or the estimated costs of enhancement and endowment (see subsection C.2.4.2, Desert Tortoise, for a discussion of the assumptions used in calculating the Security, which are based on an estimate of $2,280 per acre to fund acquisition, enhancement and long-term management). The final amount due shall be determined by an updated appraials and the PAR analysis conducted as described in **BIO-12**.

3. Title/Conveyance. The Project owner shall transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement as required by the CPM in consultation with CDFG. Transfer of either fee title or an approved conservation easement will usually be sufficient, but some situations, e.g., the donation of lands burdened by a conservation easement to BLM, will require that both types of transfers be completed. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code section 65965), or to BLM under terms approved by the CPM in consultation with CDFG. If an approved non-profit organization holds title to the compensation lands, a conservation easement shall be recorded in favor of CDFG in a form approved by the CPM. If an approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary.

4. Preparation of Management Plan: The Project owner shall submit to the CPM and CDFG a draft Management Plan that reflects site-specific enhancement measures for the drainages on the acquired compensation lands. The objective of the Management Plan shall be to enhance the wildlife value of the drainages, and may include enhancement actions such as weed control, fencing to exclude livestock, or erosion control.

5. Stop Work Provisions. The Project owner shall provide a copy of this condition (Condition of Certification **BIO-22)** from the Energy Commission Final Decision to all contractors, subcontractors, and other on-site personnel. Copies shall be readily available at work sites at all times during periods of active work and must be presented to any CDFG personnel upon demand. The CPM reserves the right to issue a stop work order or allow CDFG to issue a stop work order after giving notice to the Project owner and the CPM if the CPM, in consultation with CDFG, determines that the Project owner has breached any of the terms or conditions or for other reasons, including but not limited to the following:

   a. The information provided by the Applicant regarding impacts to waters of the state is incomplete or inaccurate;

   b. New information becomes available that was not known to staff in preparing the terms and conditions; or

   c. The Project or Project activities as described in the Staff Assessment have changed.

6. Notification: The project owner shall notify the CPM and CDFG in writing before conducting Project activities in jurisdictional areas. The Project owner shall notify the CPM and CDFG of any change of conditions to the Project, the jurisdictional impacts, or the mitigation

efforts, if the conditions at the site of a proposed Project change in a manner which changes risk to biological resources that may be substantially adversely affected by the proposed Project. The notifying report shall be provided to the CPM and CDFG no later than seven days after the change of conditions is identified. As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project as defined below. A copy of the notifying change of conditions report shall be included in the annual reports. A change of conditions is defined as follows:

a. Biological Conditions: a change in biological conditions includes, but is not limited to, the following: 1) the presence of biological resources within or adjacent to the Project area, whether native or non-native, not previously known to occur in the area; or 2) the presence of biological resources within or adjacent to the Project area, whether native or non-native, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

b. Physical Conditions: a change in physical conditions includes, but is not limited to, the following: 1) a change in the morphology of a river, stream, or lake, such as the lowering of a bed or scouring of a bank, or substantial changes in stream form and configuration caused by storm events; 2) the movement of a river or stream channel to a different location; 3) a reduction of or other change in vegetation on the bed, channel, or bank of a drainage, or 4) changes to the hydrologic regime such as fluctuations in the timing or volume of water flows in a river or stream.

c. Legal Conditions: a change in legal conditions includes, but is not limited to, a change in Regulations, Statutory Law, a Judicial or Court decision, or the listing of a species, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

7. Best Management Practices: The Project owner shall also comply with the following conditions to protect drainages near the approved impact areas as defined in the approved construction documents:

a. The Project owner shall minimize road building, construction activities and vegetation clearing within ephemeral drainages to the extent feasible.

b. The Project owner shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter ephemeral drainages or be placed in locations that may be subjected to high storm flows.

c. The Project owner shall comply with all litter and pollution laws. All contractors, subcontractors, and employees shall also obey these laws, and it shall be the responsibility of the Project owner to ensure compliance.

d. Spoil sites shall be located at least 30 feet from the boundaries and drainages or in locations that may be subjected to high storm flows, where spoils might be washed back into drainages.

e. Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances that could be hazardous to vegetation or wildlife resources, resulting from Project-related activities, shall be prevented from contaminating the soil and/or entering waters of the state. These materials, placed within or where they may enter a drainage, shall be removed immediately.

f. No broken concrete, debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into waters of the state.

g. When operations are completed, any excess materials or debris shall be removed from the work area.

h. No equipment maintenance shall occur within 150 feet of any ephemeral drainage where petroleum products or other pollutants from the equipment may enter these areas under any flow.

Verification: No less than 30 days prior to the start of construction-related ground disturbance activities potentially affecting waters of the state, the Project owner shall provide written verification (i.e., through incorporation into the BRMIMP) to the CPM that the above best management practices shall be implemented. The Project owner shall also provide a discussion of work in waters of the state in Compliance Reports for the duration of the Project.

No less than 30 days prior to beginning construction-related ground-disturbing activities the Project owner shall provide written verification of Security in accordance with this condition of certification. The Project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of construction-related ground-disturbing activities.

The Project owner shall notify the CPM and CDFG, in writing, at least five days prior to initiation of construction-related ground-disturbing activities in jurisdictional state waters and at least five days prior to completion of Project activities in jurisdictional areas. The Project owner shall notify the CPM and CDFG of any change of conditions to the Project, impacts to state waters, or the mitigation efforts. The notifying report shall be provided to the CPM and CDFG no later than seven days after the change of conditions

is identified. As used here, change of condition refers to the process, procedures, and methods of operation of a Project; the biological and physical characteristics of a Project area; or the laws or regulations pertinent to the Project as defined below. A copy of the notifying Change of Conditions report shall be included in the annual reports or until it is deemed unnecessary by the CPM, in consultation with CDFG.

The Project owner, or an approved third party, shall provide the CPM, CDFG and USFWS with a draft management plan for the compensation lands and associated funds within 180 days of the land or easement purchase, as determined by the date on the title. The CPM shall review and approve the management plan, in consultation with CDFG.

Within 90 days after completion of Project construction, the Project owner shall provide to the CPM and CDFG an analysis with the final accounting of the amount of jurisdictional state waters disturbed during Project construction.

The Project owner shall provide written verification to the CPM, USFWS and CDFG that the compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient no later than 18 months after the start of construction-related ground-disturbing activities.

On January 31st of each year following construction the Designated Biologist shall provide a report to the CPM, BLM, USFWS and CDFG that describes the results of monitoring and management of the acquisition lands. The annual report shall describe actions taken to implement the management plan (for example, fencing, erosion control, weed control) during the year and recommendations for enhancement actions that should be implemented the following year.

DECOMMISSIONING AND CLOSURE PLAN

BIO-23 Upon Project closure the Project owner shall implement a final Decommissioning and Closure Plan for the Project site. The Decommissioning and Closure Plan shall include a cost estimate for implementing the proposed decommissioning and reclamation activities, and shall be consistent with the guidelines in BLM's 43 CFR 3809.550 et seq., subject to review and revisions from the CPM in consultation with BLM, USFWS, and CDFG. The Project owner shall submit a draft Decommissioning and Closure Plan for review to the CPM, BLM, USFWS and CDFG. The Project owner shall finalize the plan only after approval from the CPM, in consultation with BLM, USFWS, and CDFG. Throughout the life of the Project the Project owner plan shall regularly submit the plan to the CPM for review and updating, if warranted, as described in Verification below. Modifications to the final Decommissioning and Closure Plan shall be made only after approval from the CPM, in consultation with BLM, USFWS, and CDFG.

Verification: No less than 30 days prior to initiating construction-related ground disturbance activities, the Project owner shall provide to BLM and the CPM a draft Decommissioning and Closure Plan. The plan shall be finalized prior to the start of commercial operation and reviewed every five years thereafter and submitted to the

CPM for approval, in consultation with BLM. Modifications to the approved Decommissioning and Closure Plan shall be made only after approval from the CPM, in consultation with BLM, USFWS, and CDFG.

No less than 10 days prior to initiating construction-related ground disturbance activities the Project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding would be available to implement measures described in the Decommissioning and Closure Plan, consistent with the provisions set forth in 43 C.F.R. sections 2805.12 and 3809.500-.599.

REVEGETATION OF TEMPORARILY DISTURBED AREAS

BIO-24 The Project owner shall prepare and implement a Revegetation Plan to restore all areas subject to temporary disturbance. The final Revegetation Plan shall be based on the draft Revegetation Plan submitted by the Applicant (TTEC 2010i) and shall include all revisions deemed necessary by the CPM inconsultation with BLM. The objectives of the Revegetation Plan shall be to stabilize disturbed soils, minimize erosion and sedimentation impacts to soil and water resources, prevent colonization by noxious weeds and other non-native plants, salvage native plantings and seed from Project Disturbance Areas, and to achieve restoration of disturbed areas to functioning, established early-successional native plant communities.

Target performance standards at the end of the monitoring period shall be as follows:

a. total absolute cover of all plants shall equal at least 30 percent;

b. survivorship of salvaged and transplanted cacti and other native plantings shall equal 30% percent;

c. at least 90 percent (relative cover) of the perennial species observed within the temporarily disturbed areas shall be locally native species that naturally occur in the adjacent desert scrub or dune habitats;

d. relative cover of perennial plant species shall equal at least 60 percent of the total vegetative cover; and

e. Relative cover of non-native plants within the temporarily disturbed areas shall not exceed the relative cover of non-native plants in the adjacent habitats.

Verification: No less than 30 days prior to construction-related ground-disturbance activities the Project owner shall submit to the CPM a final agency-approved Revegetation Plan that has been reviewed and approved by the CPM. All modifications to the Revegetation Plan shall be made only after approval from the CPM.

Within 30 days after completion of Project construction, the Project owner shall provide to the CPM for review and approval a report identifying which items of the Revegetation

Plan have been completed, a summary of all modifications to revegetation measures made during the Project's construction phase, and which items are still outstanding.

The Designated Biologist shall provide reports to the CPM according to the reporting schedule in the Revegetation Plan that that includes: a summary of revegetation activities for the year, a discussion of whether revegetation performance standards for the year were met; and recommendations for revegetation remedial action, if warranted, planned for the upcoming year. Reports shall be submitted on January 31st following the relevant reporting year.

GROUNDWATER DEPENDENT VEGETATION MONITORING

BIO-25 The Applicant shall prepare and implement a Draft Groundwater-Dependent Vegetation Monitoring Plan (Vegetation Monitoring Plan). The objectives of the Vegetation Monitoring Plan shall be to monitor the Project effects of groundwater pumping on groundwater-dependent vegetation (phreatophytes) and, in conjunction with **BIO-26**, to ensure that the Project has a less than significant effect on groundwater-dependent ecosystems. The Vegetation Monitoring Plan shall be consistent with guidance for designing vegetation monitoring plans and conducting statistical analysis in *Measuring and Monitoring Plant Populations* (Elzinga et al. 1998). Monitoring shall focus on areas containing obligate or facultative phreatophytes (mesquite, ironwood, bush seep-weed, palo verde, cat's claw, smoke tree, and tamarisk) in areas that are most likely to be influenced by groundwater (low-lying areas in the basin floor). Monitoring sites shall include:

1. Reference Monitoring Sites: sites outside of the zone of Project influence that can be compared to sites influenced by Project pumping and used to distinguish Project effects from the effects of climate change or normal drought cycles; sites located in state or national parks are least likely to be influenced by human-caused hydrologic alterations.

2. Project Monitoring Sites: sites within the predicted worst-case scenario drawdown cone around the Project pumping well (Figure 3 of the Groundwater Resources Cumulative Impacts Analysis [Worley-Parsons 2009]), an area within a radius of approximately 10 miles from the Project pumping well. Ford Dry Lake, and the old-growth ironwood forest along the Palen wash are also included within this zone.

3. Distant Monitoring Sites: sites located near Palen Dry Lake within the predicted worst-case scenario drawdown cone around the Project pumping well around Palen Dry Lake where near-surface groundwater has been detected and where plant communities dominated by phreatophytes occur (including bush seep-weed-dominant alkali sink scrubs). In areas where the Project's estimated end of operation effects overlap the Palen Solar Power Project's estimated zone of water table effects (AECOM 2010a, Figures DR-ALT-207-1 & 2), the Project shall not be responsible for monitoring groundwater-dependent

vegetation unless the Palen project (or other project at same site) is not constructed and/or no groundwater pumping is proposed by that project.

Baseline data shall be collected at all sites prior to the start of pumping, and annual monitoring for the life of the Project shall be required at Project, Distant, and Reference Monitoring sites. A statistician shall be retained to use the first year of baseline data to conduct a “priori power analysis” (Elzinga et al. 1998) and evaluate the adequacy of the sampling design.

The Vegetation Monitoring Plan shall:

1. Be prepared by a qualified plant ecologist with a demonstrated understanding of desert plant ecology and physiology. The plant ecologist overseeing the monitoring and preparing the annual reports shall be approved by the CPM;

2. Identify Project Monitoring Sites within the zone of potential Project effect depicted in Figure 3 of the Groundwater Resources Cumulative Impacts Analysis (Worley-Parsons 2009). Monitoring shall focus on areas containing obligate or facultative phreatophytes in areas that are the most likely to be influenced by groundwater (versus surface water) such as low lying areas in the basin floor outside of the stream channels;

3. Identify Distant Monitoring sites around Palen Dry Lake where near-surface groundwater and plant communities dominated by phreatophytes occur, including mesquite stands, bush seepweed-dominant sink scrubs, and dune scrubs;

4. Identify Reference Monitoring Sites within the Sonoran or Colorado Desert regions of California that contain examples of the target groundwater-dependent plant communities represented at the Project and Distant Monitoring Sites. Reference sites shall be characterized by surface and groundwater hydrology unaltered by anthropogenic influences such as groundwater pumping or other diversions. Sites located in state park and national park lands or wilderness areas are likely candidates for reference sites;

5. Provide a detailed description of sampling protocol for collecting a minimum of three years of baseline data from the Reference, Project, and Distant Monitoring Sites. The sampling protocol shall include a requirement that monitoring data be collected from all three monitoring sites at the same time of year at the start of the growing season (for example, March 15). A statistician shall be consulted during the design phase to conduct a “priori power analysis” (Elzinga et al. 1998) prior to determining an appropriate sample size achieve adequate power;

6. Provide a detailed description of the long-term data collection approach including: sampling objectives (target/threshold, change/trend-based) attributes measured, field techniques, minimum standards for monitoring

personnel, data management, statistical analysis, monitoring schedule, reporting requirements, and responsible parties;

7. Include appropriate field techniques for measuring drought response, including (at a minimum): percent dieback; live crown density; percent cover of live (versus dead or residual) vegetation, and any other vigor indicators that detect subtle changes over time; percent cover/frequency of associated species, changes over time in percent composition of native versus non-native species, and facultative wetland plants present. A detailed description of monitoring protocol shall also be included (for example, photo monitoring at permanent photo stations, among other monitoring techniques);

8. Include a description of the biological and ecological characteristics of groundwater-dependent species and natural communities, such as whether species are obligate vs. facultative; root growth and water acquisition; morphological adaptations to the desert environment; reproduction and germination; general and micro-habitat preferences; salt tolerance; role in the morphology of dunes; wildlife uses, etc;

9. Describe annual reporting requirements, which shall include (at a minimum): summaries of the results of the Groundwater Well Monitoring **(Soil&Water-5)** and a comparison of predicted versus actual water table declines during the early spring monitoring period, summary of the Vegetation Monitoring data, sampling and monitoring techniques used, field measurements employed, names and contact information for the monitoring personnel and responsible parties, description of data management, statistical analysis, photos, and conclusions.

Trigger for Remedial Action: The Project owner shall implement remedial action, as described in Condition of Certification **BIO-26,** if the monitoring described in **BIO-25** detects declining spring water tables—in any amount greater than the normal year-to-year variability—combined with a decline in plant vigor in groundwater dependent vegetation at the Project Monitoring Sites compared to the Reference Monitoring Sites. The baseline spring water table depth, as measured in groundwater monitoring conducted pursuant to Soil & Water-4 and 5, shall be established based on the normal range of variability in area shallow water tables in spring (March 15-April 1).

The project owner may not pump groundwater from the site until the final Vegetation Monitoring Plan has been reviewed and approved by the CPM.

Verification: No more than 60 days following the docketing of the Energy Commission Final Decision, the Project owner shall submit to the CPM a final Vegetation Monitoring Plan that has been reviewed and approved by the CPM. All modifications to the Vegetation Monitoring Plan shall be made only after approval from the CPM.

Monitoring shall begin no later than April 1st following docketing of the Energy Commission Final Decision and shall occur every year during the same one to two week time period in early spring.

On January 31st of each year following the start of data collection, the Designated Biologist shall provide a report, prepared by the plant ecologist supervising the study and analyzing the data, to the CPM that describes monitoring activities and results, including recommendations for remedial action. If monitoring detects declining spring water tables—in any amount greater than the normal year-to-year variability of spring water tables—combined with a decline in plant vigor in groundwater dependent vegetation at the Project Monitoring Sites that is not also detected in the Reference Sites (by comparing monitoring site data with reference site data), the supervising plant ecologist shall prepare a summary of the data analysis within 30 days of completion of that monitoring.

REMEDIAL ACTION FOR ADVERSE EFFECTS TO GROUNDWATER-DEPENDENT BIOLOGICAL RESOURCES

BIO-26 The Project owner shall implement remedial action if the monitoring described in **BIO-25** detects project-related declining spring water tables—in any amount greater than the normal year-to-year variability—combined with a decline in plant vigor in groundwater dependent vegetation at the Project Monitoring Sites compared to the Reference Monitoring Sites. The baseline spring water table depth, as measured in groundwater monitoring conducted pursuant to **Soil & Water-4 and 5**, shall be established based on the normal range of variability in area shallow water tables in spring (March 15-April 1). The Project owner shall submit a detailed proposal for remedial action to be approved by the CPM. Remedial measures must include one of the following measures to meet the performance standard of restoring the spring groundwater tables to baseline levels: 1) Relocating the Project pumping well to another location farther from the groundwater-dependent vegetation (and where the dependent vegetation is no longer within the drawdown cone of depression), or—alternatively—constructing a new well farther away and reducing water usage in the well closest to the dependent plant communities; 2) Reducing the Project water usage through water conservation methods or new technologies.

The proposal shall clearly demonstrate that the proposed remedial action would restore the spring groundwater tables to baseline levels to sustain healthy ecological functioning in the affected plant communities. The Project owner may choose the most feasible method of restoring baseline spring water table levels providing it meets this performance standard.

The Project owner must implement remedial action, as approved by the CPM.

Verification: Within 90 days following submission of the data summary described in **BIO-25** that triggers remedial action according to the threshold described in **BIO-25,** the Project owner shall submit to the CPM a draft, or conceptual plan for remedial action. The draft plan shall summarize the data and observations describing the adverse effect, including all calculations and assumptions made in development of the report data and interpretations. The draft plan must include, but not limited to, one of the remedial measures described above to meet the performance standard of restoring the spring

groundwater table to baseline levels. A final plan shall be submitted to the CPM within 60 days of receipt of the CPM's comments.

No later than one year following approval of the remedial action plan, the Project owner shall provide to the CPM for review and approval, documentation of completed remedial action.

If, after review of the annual monitoring data described in **BIO-25** and in **Soil & Water-5**, the CPM agrees, monitoring measurements and frequencies may be revised or eliminated.

COUCH'S SPADEFOOT TOAD IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-27 The Project owner shall prepare and implement a Couch's Spadefoot Toad Protection and Mitigation Plan (Protection and Mitigation Plan) to avoid, minimize or mitigate impacts to Couch's spadefoot toads and their breeding habitat during construction and operation of the Project. The Protection and Mitigation Plan shall be approved by the CPM in consultation with CDFG, and shall be incorporated into the Project's BRMIMP and implemented. It is expected that, as currently proposed, the Project could avoid the known breeding pond south of I-10 near Wiley Well Road and minimize impacts to the surrounding upland buffer. The Protection and Mitigation Plan shall address methods to achieve this avoidance and minimization, and shall include avoidance, minimization, and mitigation measures that would be required if additional habitat is found during habitat surveys. The Protection and Mitigation Plan shall include, at a minimum:

1. Habitat Survey Results:
   a. Survey methodology;
   b. Survey results, including a detailed discussion of potential breeding sites, and a description of areas determined not to include breeding habitat; and
   c. Figures showing the areas surveyed and the location of potential breeding habitat in relation to proposed Project features.
2. Impacts Assessment from:
   a. Habitat disturbance from construction;
   b. Noise from construction, operations, and potential ORV traffic;
   c. Increased access for vehicles from road construction or improvements;
   d. Changes in breeding habitat due to changes in flow levels and flow patterns to breeding ponds;

e. Increased traffic from construction and operations;

f. Increased risk of predation.

3. Avoidance and Minimization Measures:

   a. Description of measures that would be implemented to avoid impacts to potential breeding ponds, such as design strategies; protective fencing or other barriers, worker's education, minimizing construction traffic within the vicinity of breeding ponds, and biological monitoring;

   b. Designation of a Management Area around breeding ponds that includes an appropriate upland buffer, and a description of measures used to minimize impacts within this buffer.

4. Mitigation: If complete avoidance of the pond south of I-10 or other breeding sites identified during surveys is not possible, the Protection and Mitigation Plan shall include plans to create additional breeding habitats (ephemeral pond) at least equal in area to the acreage of ponds being impacted. The created ponds shall be capable of holding water for at least nine days during the spadefoot toad breeding season, and shall be established as close as possible (no more than ¼ mile) from the location of the impacted ponds. The created ponds shall be monitored and managed to ensure fulfillment of this performance standard by site visits at the pond following summer rainfall events. If the created ponds fail to achieve this standard, remedial action shall be implemented (for example, by compacting the soil in the pond to increase water-holding capacity).

Verification: No less than 30 days prior to construction-related ground-disturbance the Project owner shall submit to the CPM and CDFG a final Protection and Mitigation Plan. Modifications to the Protection and Mitigation Plan shall be made only after approval from the CPM, in consultation with CDFG.

If the Protection and Mitigation Plan includes creation of ponds, the number and acreage of created ponds shall be described in the plan. No less than 90 days prior to operation of Project the Project owner shall provide to the CPM as-built drawings and photographs of the created ponds and maps showing the size and location of the ponds in relation to project features. On January 31st of every year following initiation of operation of the Project the Project owner shall submit reports to the CPM documenting the capacity of the created ponds to hold water for at least 9 days during the spadefoot toad breeding season. If ponds fail to hold water as described above the Project owner shall implement remedial actions. The annual reporting may be terminated upon satisfactory demonstration of this performance standard, and with approval of the CPM.

GOLDEN EAGLE INVENTORY AND MONITORING

BIO-28 The Project owner shall implement the following measures to avoid or minimize Project-related construction impacts to golden eagles.

1. Annual Inventory During Construction. For each calendar year during which construction will occur an inventory shall be conducted to determine if golden eagle territories occur within 10 miles of the Project boundaries. Survey methods for the inventory shall be as described in the Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations (Pagel et al. 2010) or more current guidance from the USFWS.

2. Inventory Data: Data collected during the inventory shall include at least the following: territory status (unknown, vacant, occupied, breeding successful, breeding unsuccessful); nest location, nest elevation; age class of golden eagles observed; nesting chronology; number of young at each visit; digital photographs; and substrate upon which nest is placed.

3. Determination of Unoccupied Territory Status: A nesting territory or inventoried habitat shall be considered unoccupied by golden eagles ONLY after completing at least 2 full aerial surveys in a single breeding season. In circumstances where ground observation occurs rather than aerial surveys, at least 2 ground observation periods lasting at least 4 hours or more are necessary to designate an inventoried habitat or territory as unoccupied as long as all potential nest sites and alternate nests are visible and monitored. These observation periods shall be at least 30 days apart for an inventory, and at least 30 days apart for monitoring of known territories.

4. Monitoring and Adaptive Management Plan: If an occupied nest[8] is detected within 10 miles of the Project boundaries, the Project owner shall prepare and implement a Golden Eagle Monitoring and Management Plan for the duration of construction to ensure that Project construction activities do not result in injury or disturbance to golden eagles. The monitoring methods shall be consistent with those described in the Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations (Pagel et al. 2010) or more current guidance from the USFWS. The Monitoring and Management Plan shall be prepared in consultation with the USFWS. Triggers for adaptive management shall include any evidence of Project-related disturbance to nesting golden eagles, including but not limited to: agitation behavior (displacement, avoidance, and defense); increased

[8] An occupied nest is one used for breeding by a pair of golden eagles in the current year. Presence of an adult, eggs, or young, freshly molted feathers or plucked down, or current years' mutes (whitewash) also indicate site occupancy. Additionally, all breeding sites within a breeding territory are deemed occupied while raptors are demonstrating pair bonding activities and developing an affinity to a given area. If this culminates in an individual nest being selected for use by a breeding pair, then the other nests in the nesting territory will no longer be considered occupied for the current breeding season. A nest site is considered occupied throughout the periods of initial courtship and pair‐bonding, egg laying, incubation, brooding, fledging, and post‐fledging dependency of the young.

vigilance behavior at nest sites; changes in foraging and feeding behavior, or nest site abandonment. The Monitoring and Management Plan shall include a description of adaptive management actions, which shall include, but not be limited to, cessation of construction activities that are deemed by the Designated Biologist to be the source of golden eagle disturbance.

Verification: No fewer than 30 days from completion of the golden eagle inventory the project owner shall submit a report to the CPM, CDFG, and USFWS documenting the results of the inventory.

If an occupied nest is detected within 10 miles of the Project boundary during the inventory, at least 30 days prior to the start of any pre-construction site mobilization the project owner shall provide the CPM, CDFG, and USFWS with the final version of the Golden Eagle Monitoring and Management Plan. This final Plan shall have been reviewed and approved by the CPM in consultation with USFWS. If no occupied nests are detected during the inventory and a Plan is not warranted, a letter from USFWS documenting this determination shall be submitted to the CPM at least 10 days prior to the start of any pre-construction site mobilization.

IN-LIEU FEE MITIGATION OPTION

BIO-29 The Project owner may choose to satisfy its mitigation obligations identified in this Decision by paying an in lieu fee instead of acquiring compensation lands, pursuant to Fish and Game code sections 2069 and 2099 or any other applicable in-lieu fee provision, to the extent the in-lieu fee provision is found by the Commission to be in compliance with CEQA and CESA requirements.

Verification: If electing to use this provision, the Project owner shall notify the Commission that it would like a determination that the Project's in-lieu fee proposal meets CEQA and CESA requirements.

C.2.14 REFERENCES

The tn: 00000 in some of the references below indicates the transaction number under which the item is catalogued in the Energy Commission's Docket Unit. The transaction number allows for quicker search and retrieval of individual items docketed for a case or used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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AECOM 2010a- AECOM Environment (tn: 55035). Palen Solar Energy Project Data Responses, Set 1 (#1-280), dated 1/22/2010.

AECOM 2010b- AECOM/ W. Graham (tn: 56734). Palen Solar Energy Project - Mojave Fringe-Toed Lizard Lands in the Chuckwalla Valley, dated 4/14/2010.

AECOM 2010c- AECOM/ W. Graham (tn: 56625). Palen Solar Energy Project – Preliminary Spring Survey Results for Desert Tortoise, Rare Plants and Jurisdictional Waters, dated 5/7/10.

AECOM 2010d- AECOM (tn 56623) – Blythe Solar Energy Project - Preliminary Spring 2010 Survey Results for Desert Tortoise, Rare Plants and Jurisdictional Waters, submitted 5/14/2010.

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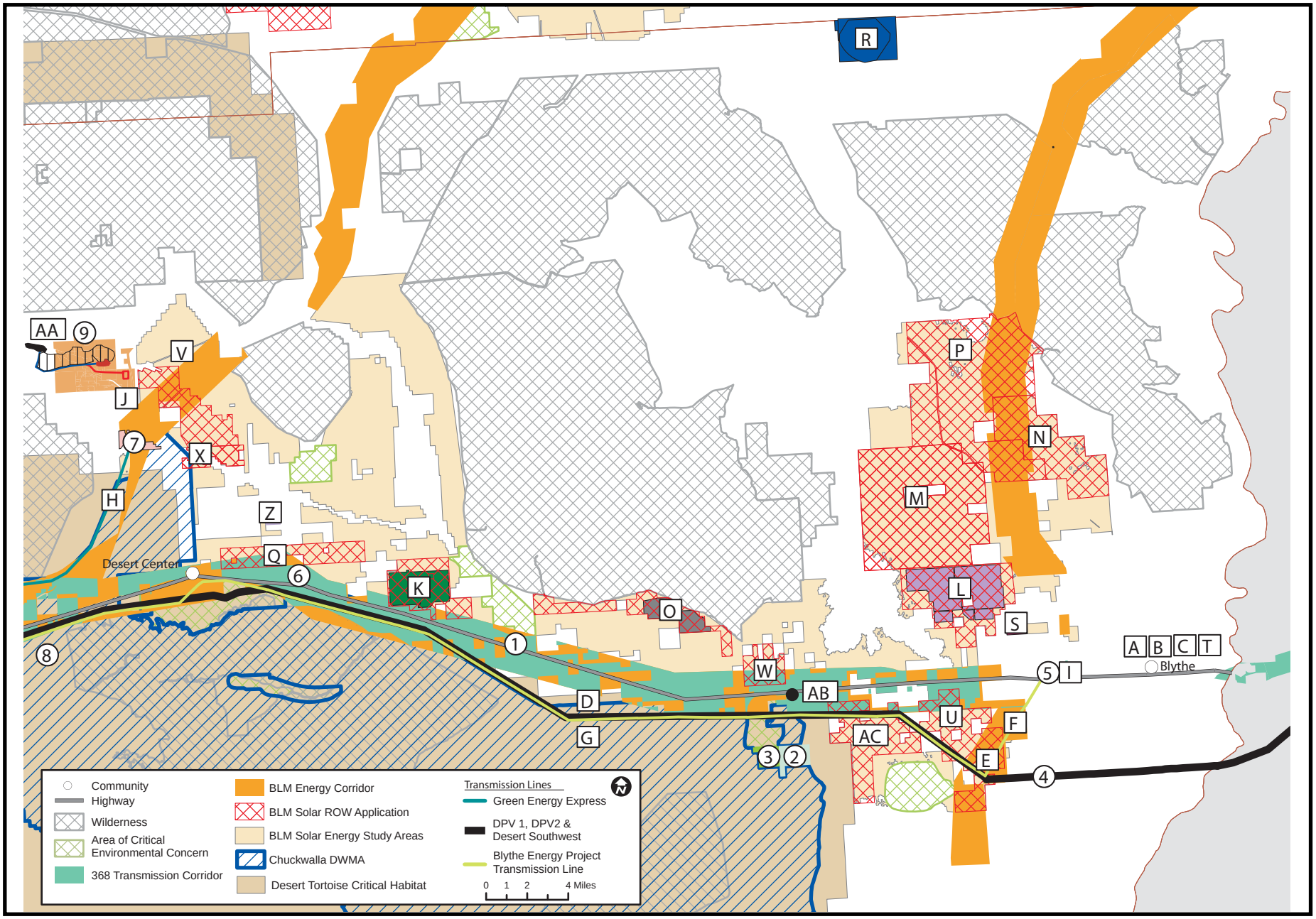
BIOLOGICAL RESOURCES - FIGURE 1

Genesis Solar Energy Project - I-10 Corridor Existing and Future/Foreseeable Projects

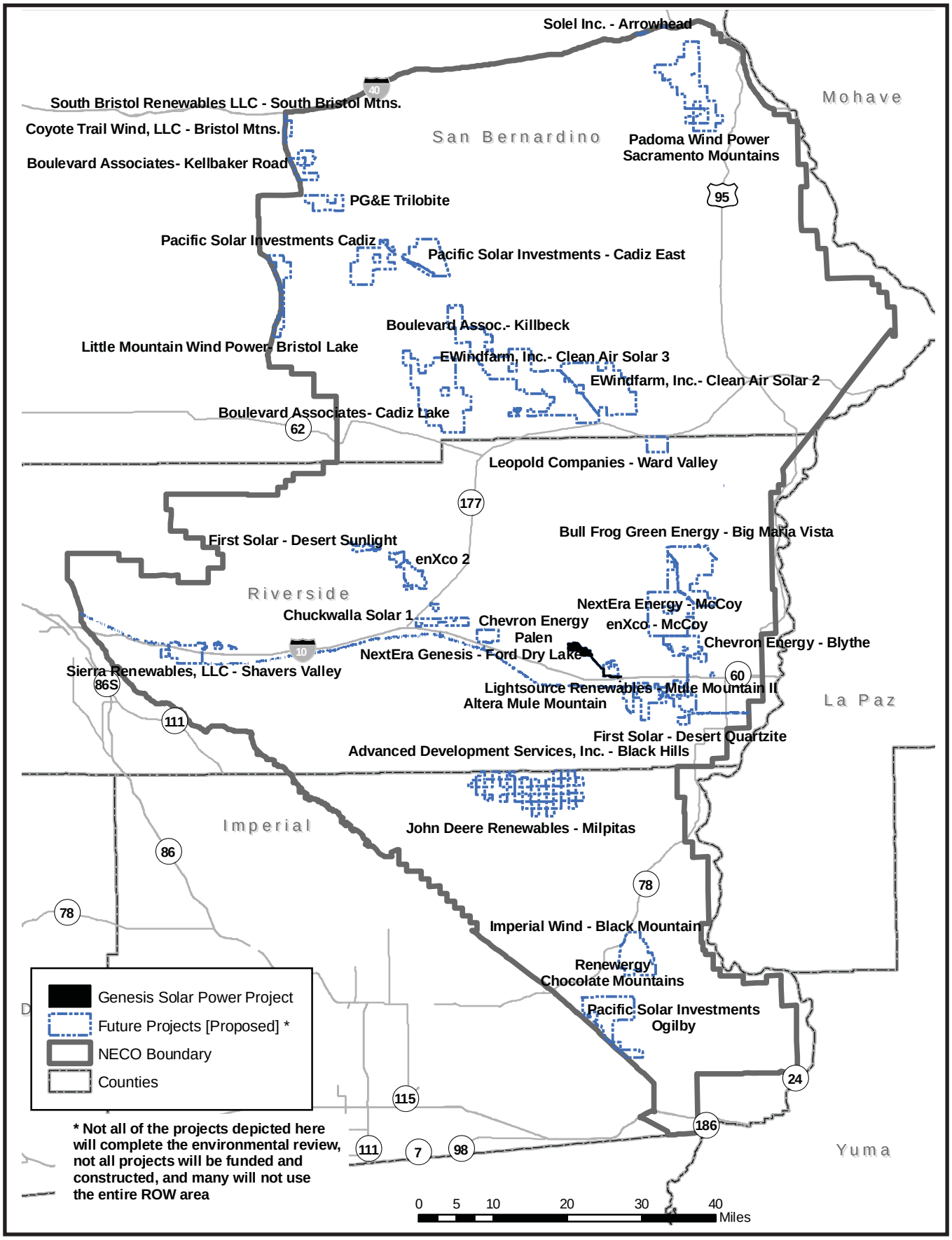


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 2

Genesis Solar Energy Project - Foreseeable Future Projects (Proposed)

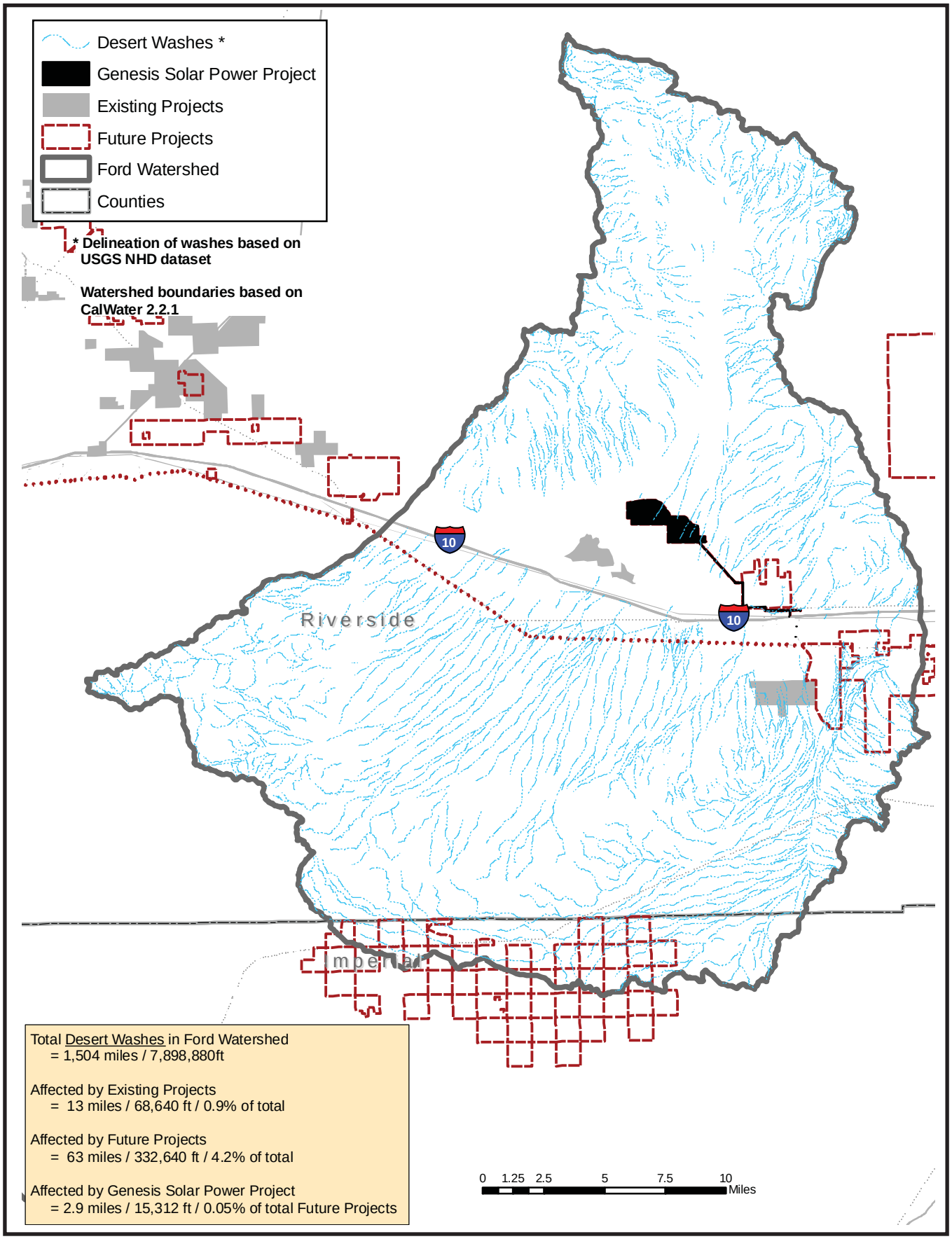


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 3

Genesis Solar Energy Project - Desert Washes - Ford Watershed

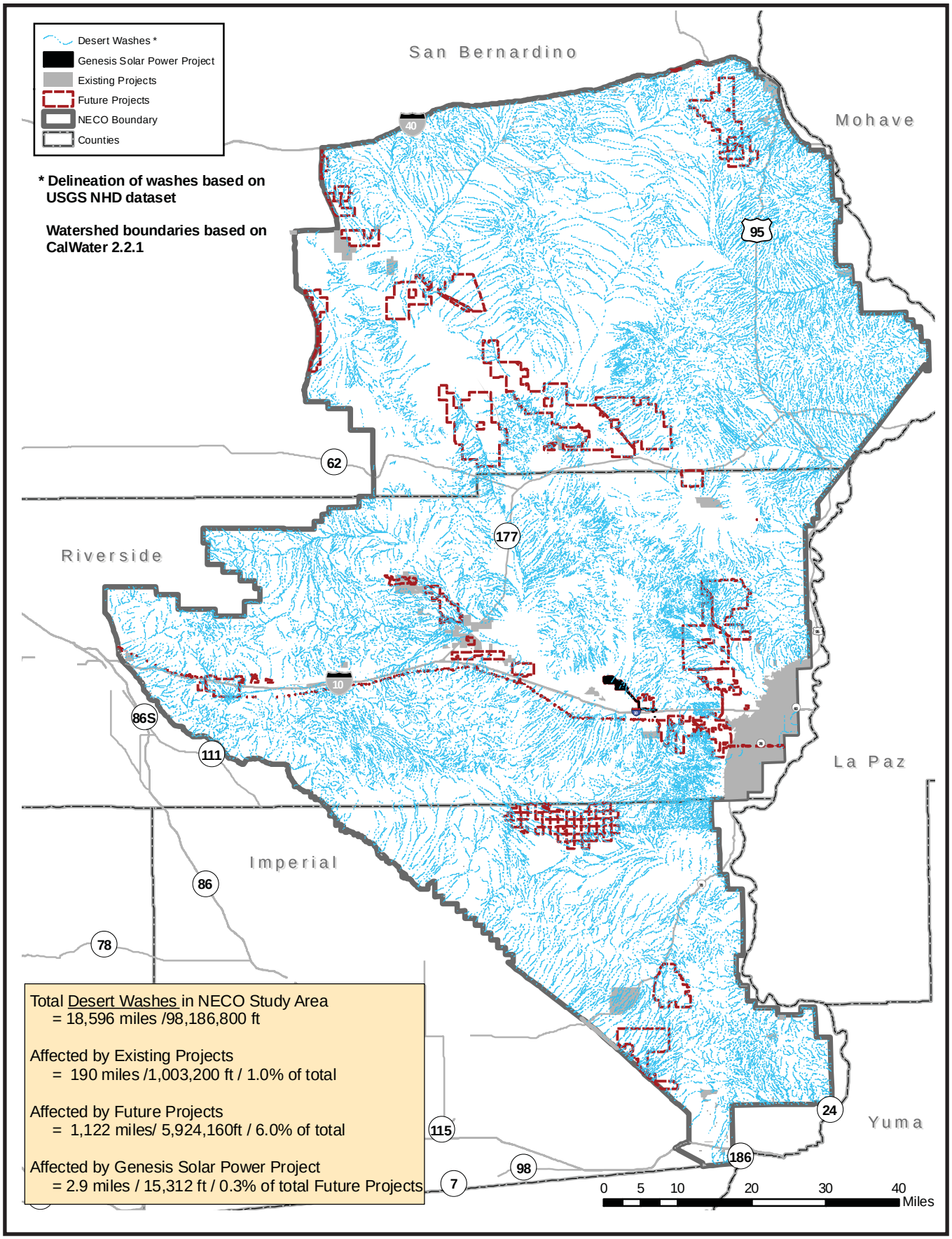


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 4

Genesis Solar Energy Project - Desert Washes

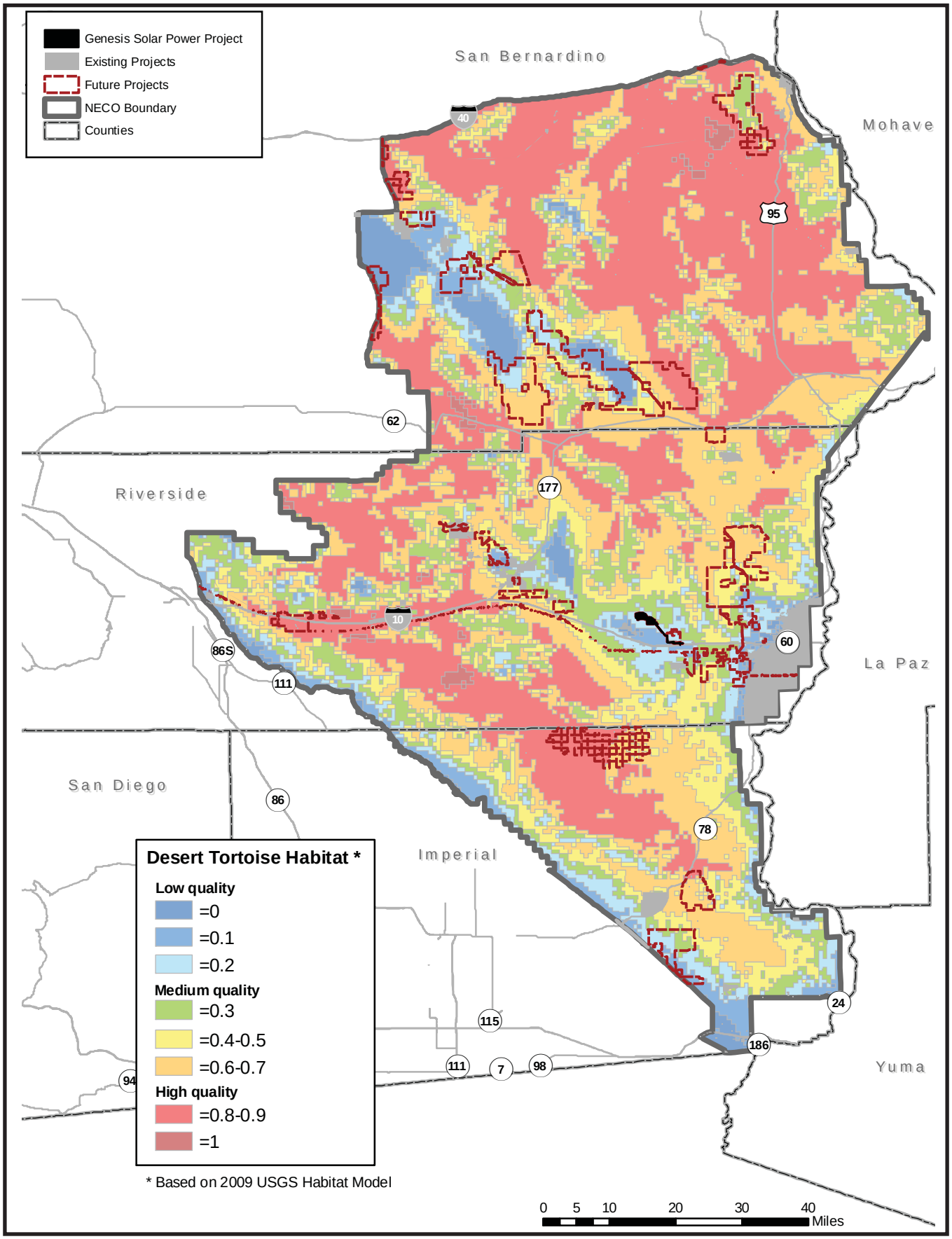


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 5

Genesis Solar Energy Project - Desert Tortoise Habitat

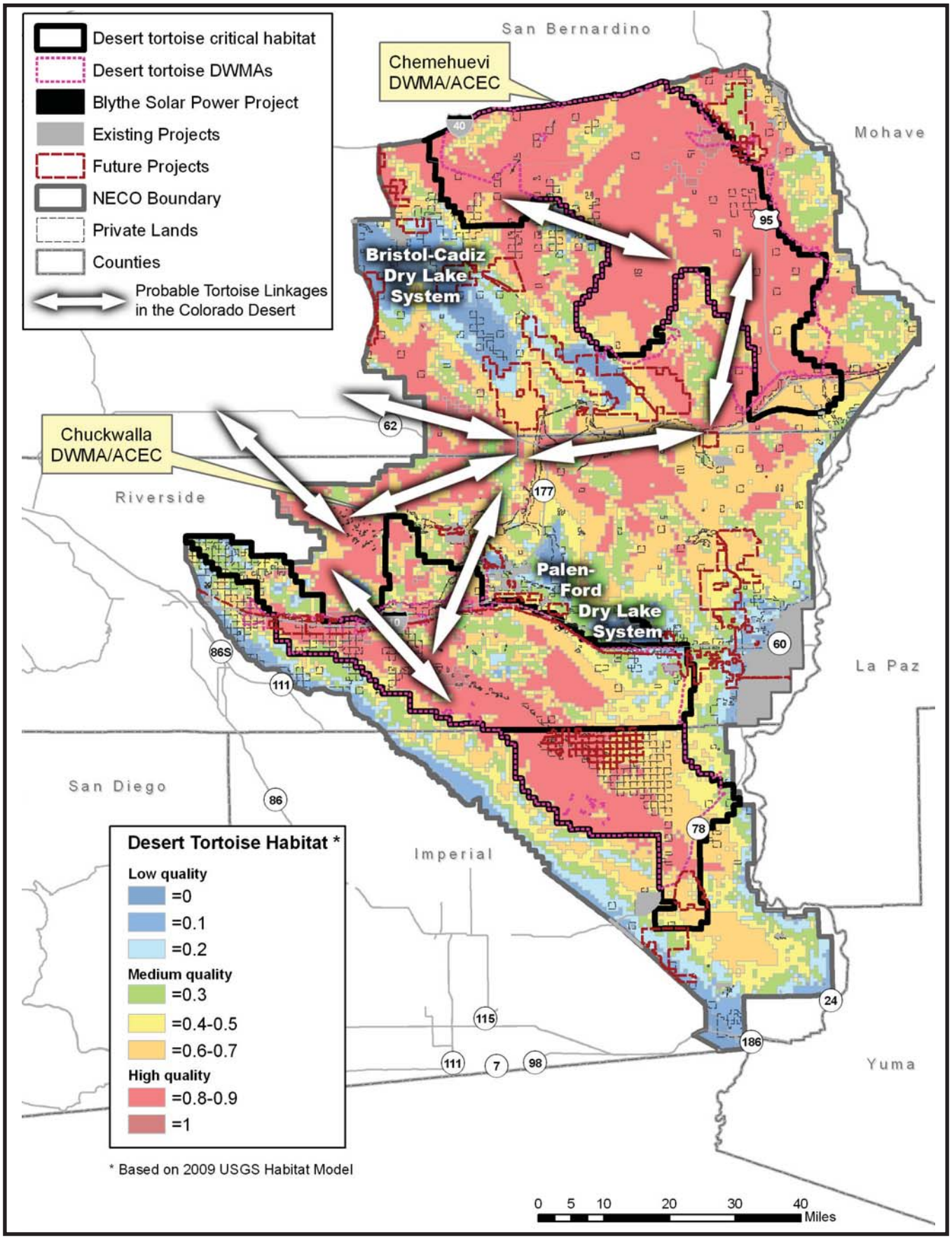


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 6

Genesis Solar Energy Project - Desert Tortoise - Chuckwalla to Chemehuevi DWMAs and Critical Habitat

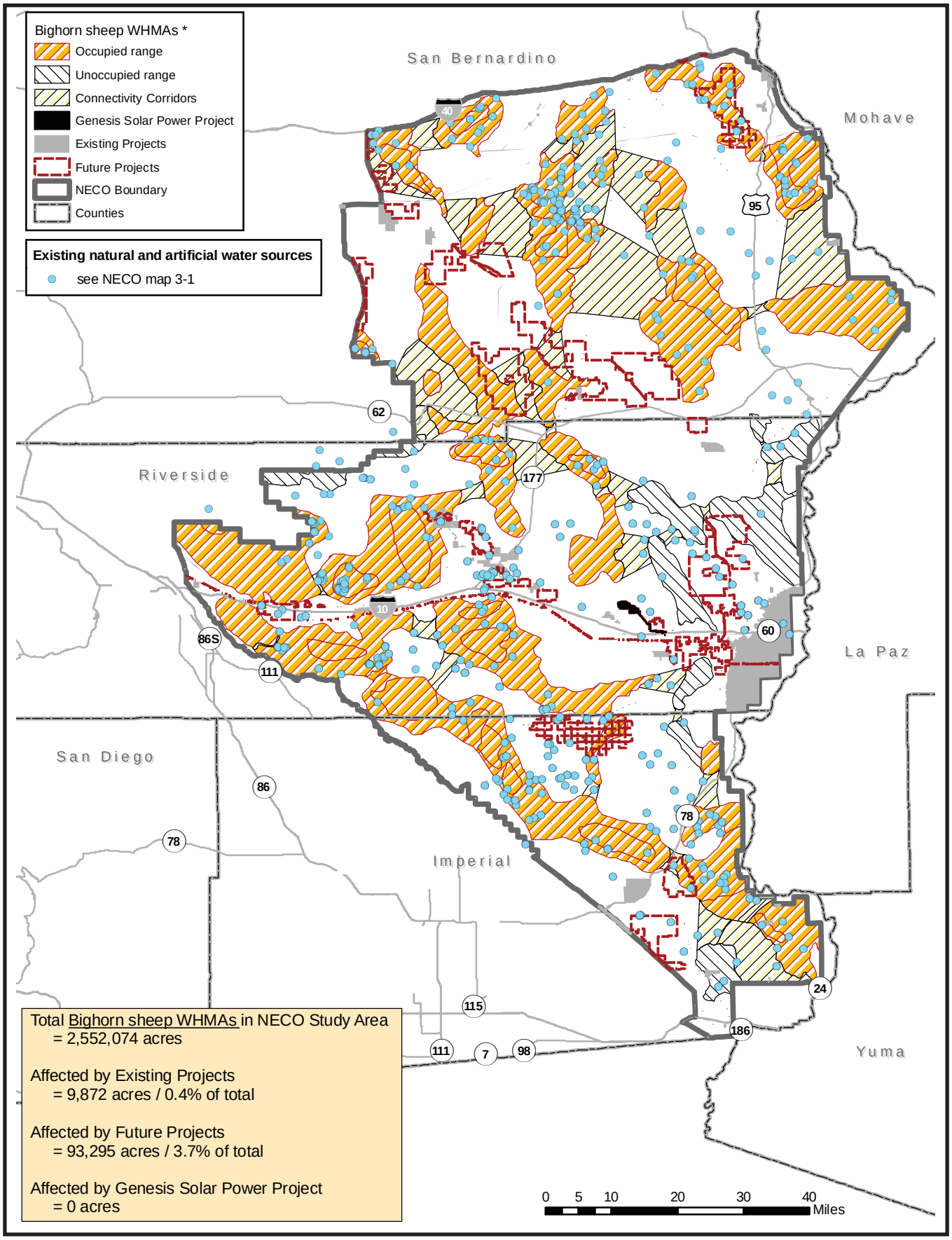


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 7A

Genesis Solar Energy Project - Bighorn Sheep WHMAs

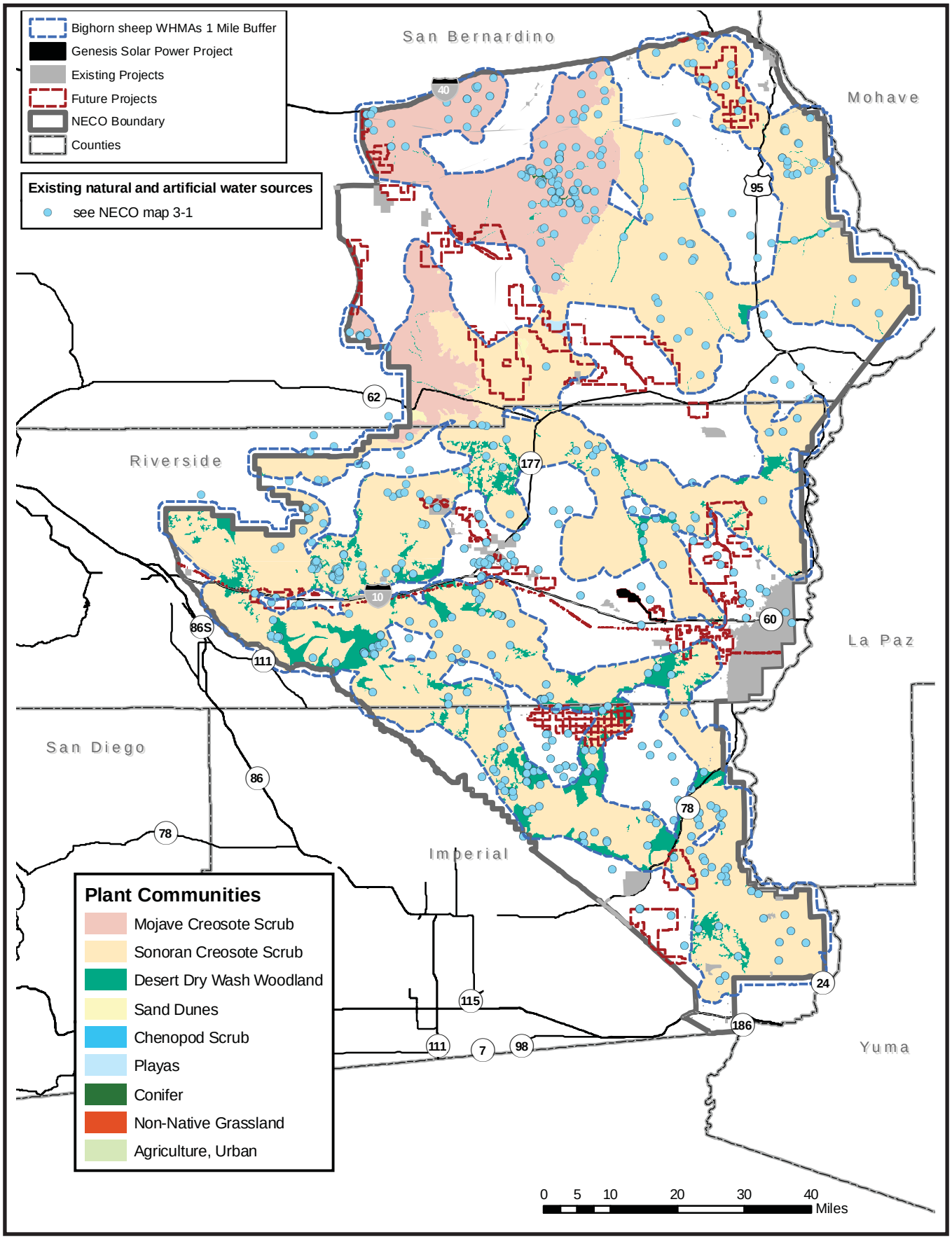


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 7B

Genesis Solar Energy Project - Bighorn Sheep - Spring Forage

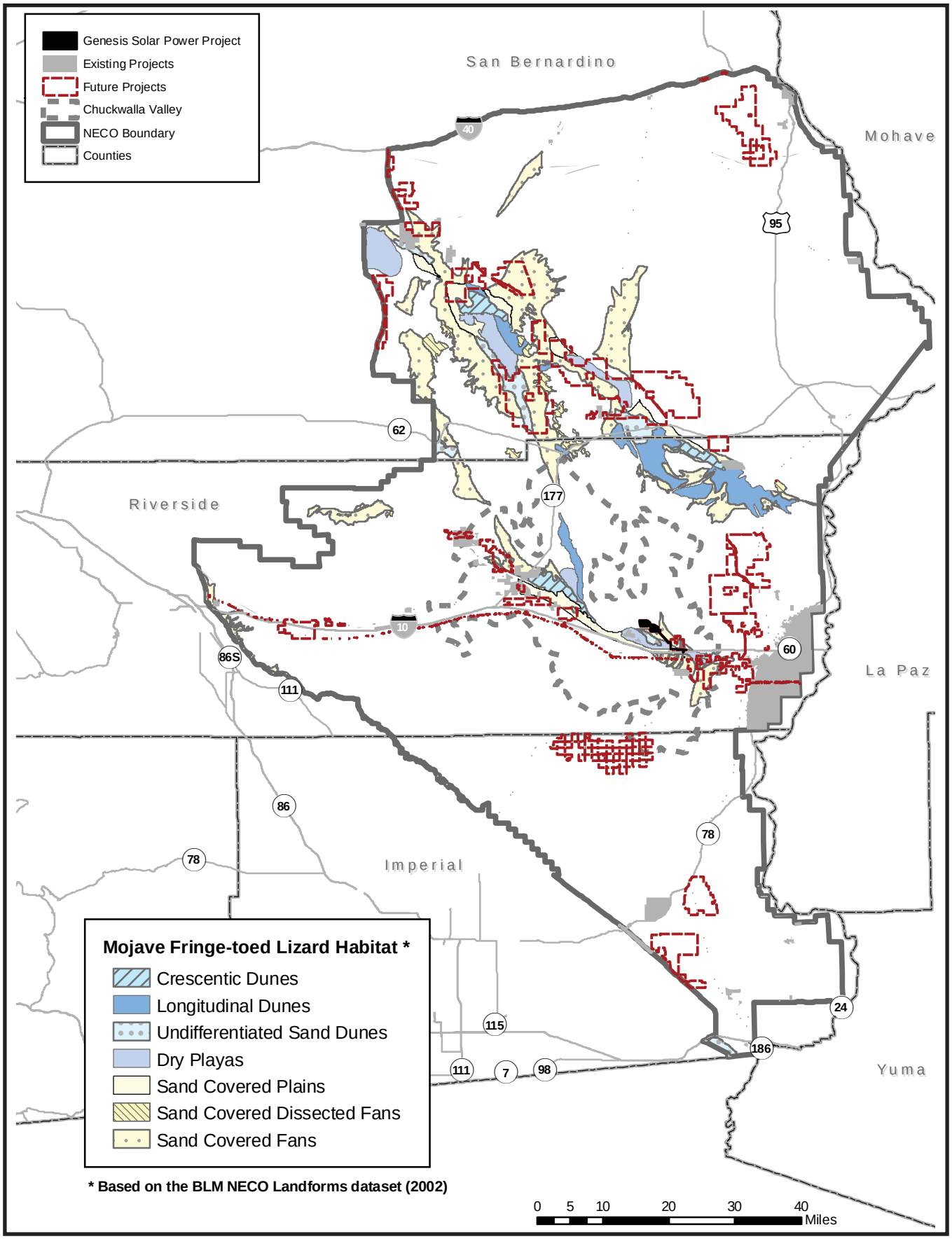


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 8

Genesis Solar Energy Project - Mojave Fringe-Toed Lizard Habitat

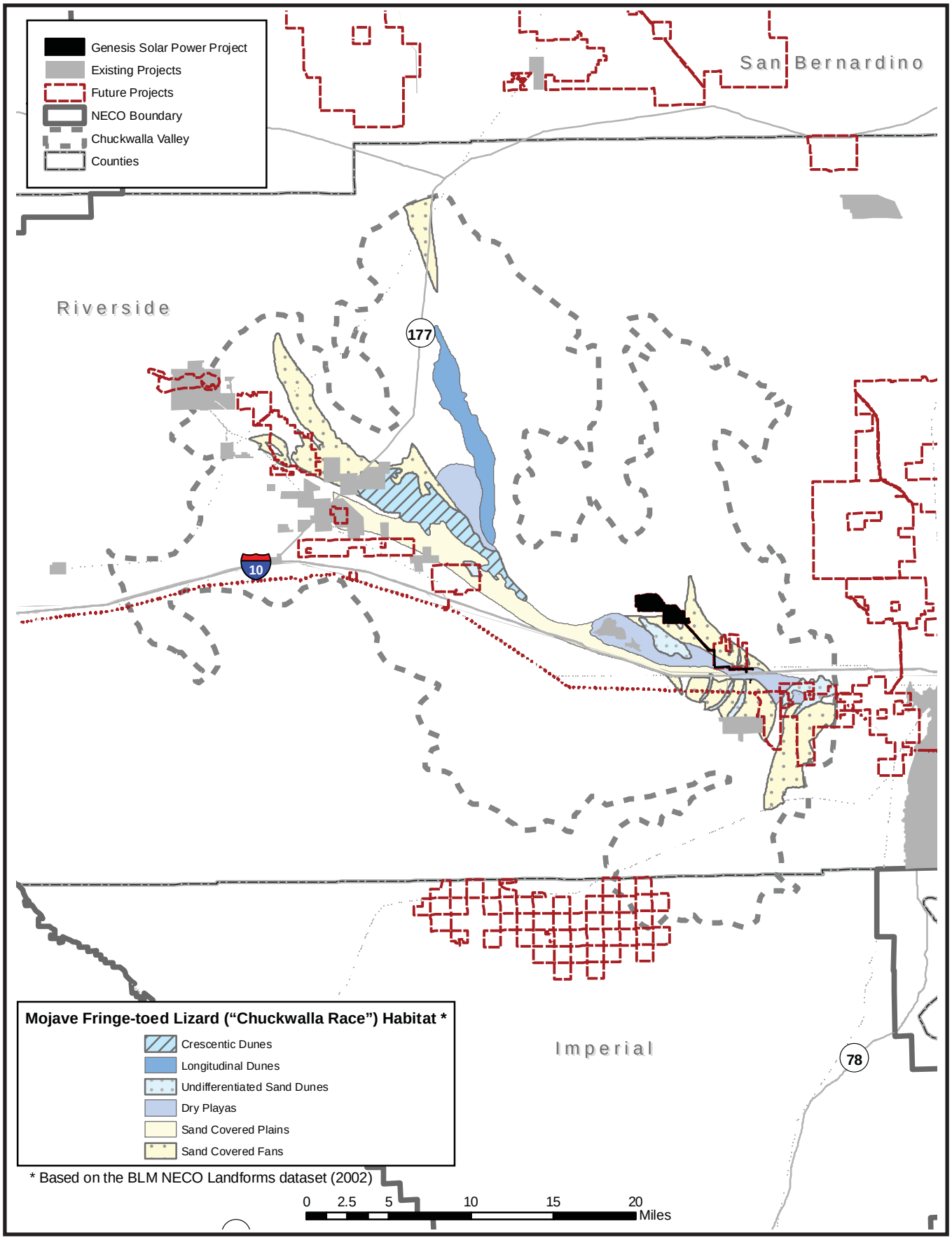


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 9

Genesis Solar Energy Project - Mojave Fringe-Toed Lizard ("Chuckwalla Race") Habitat

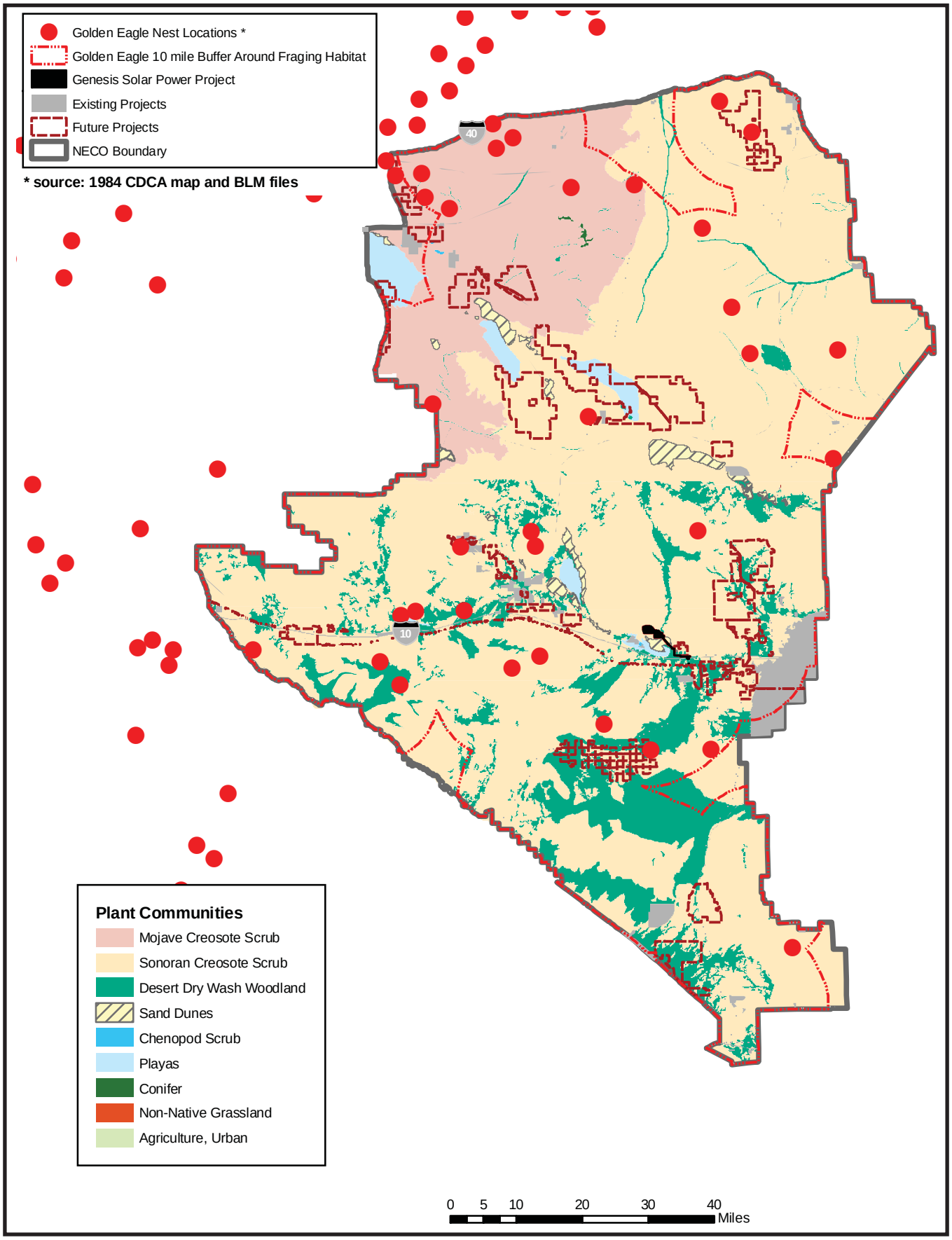


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 10

Genesis Solar Energy Project - Golden Eagle Nest Locations

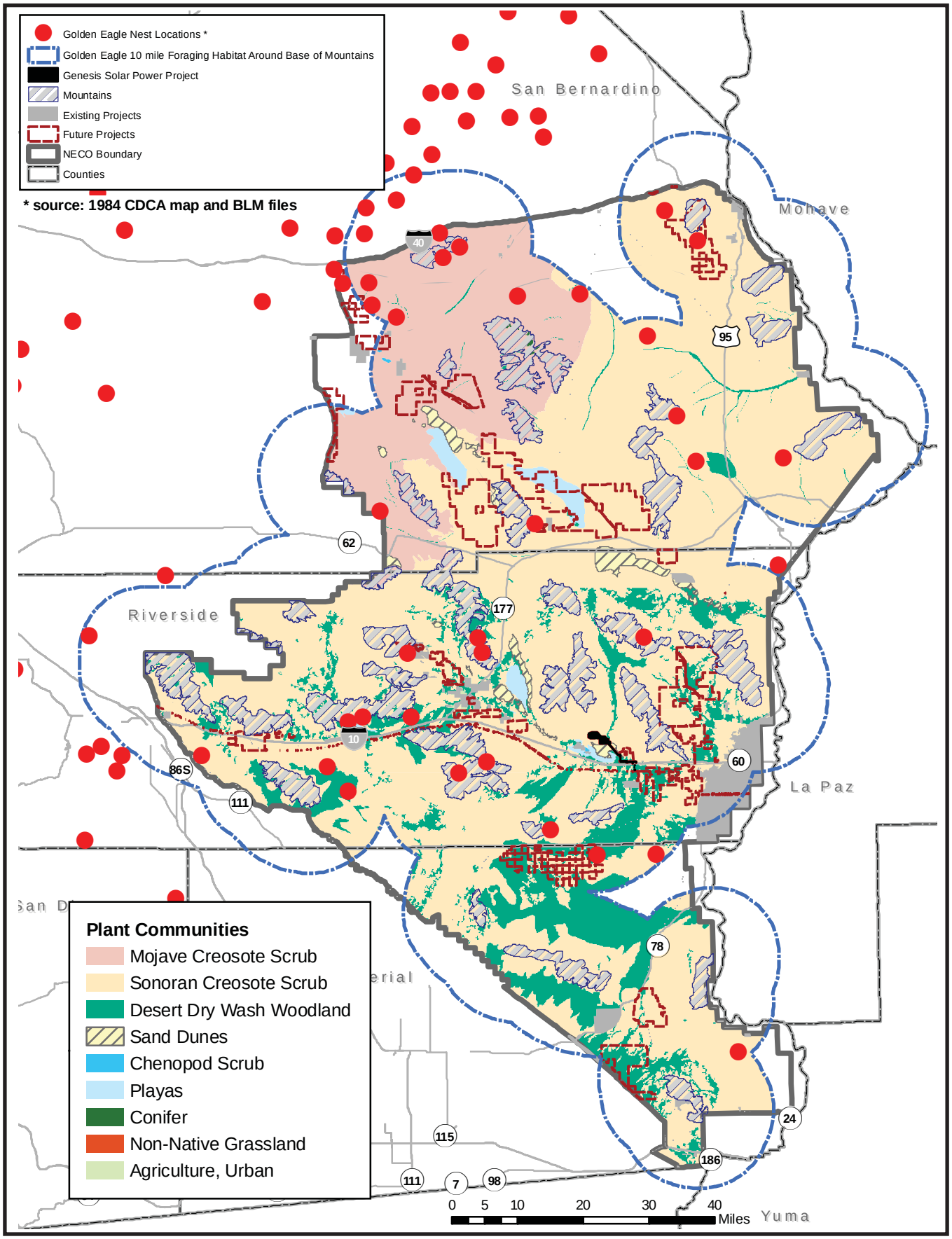


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 11A

Genesis Solar Energy Project - Golden Eagle Foraging Habitat Within 10 Miles Of Mountains

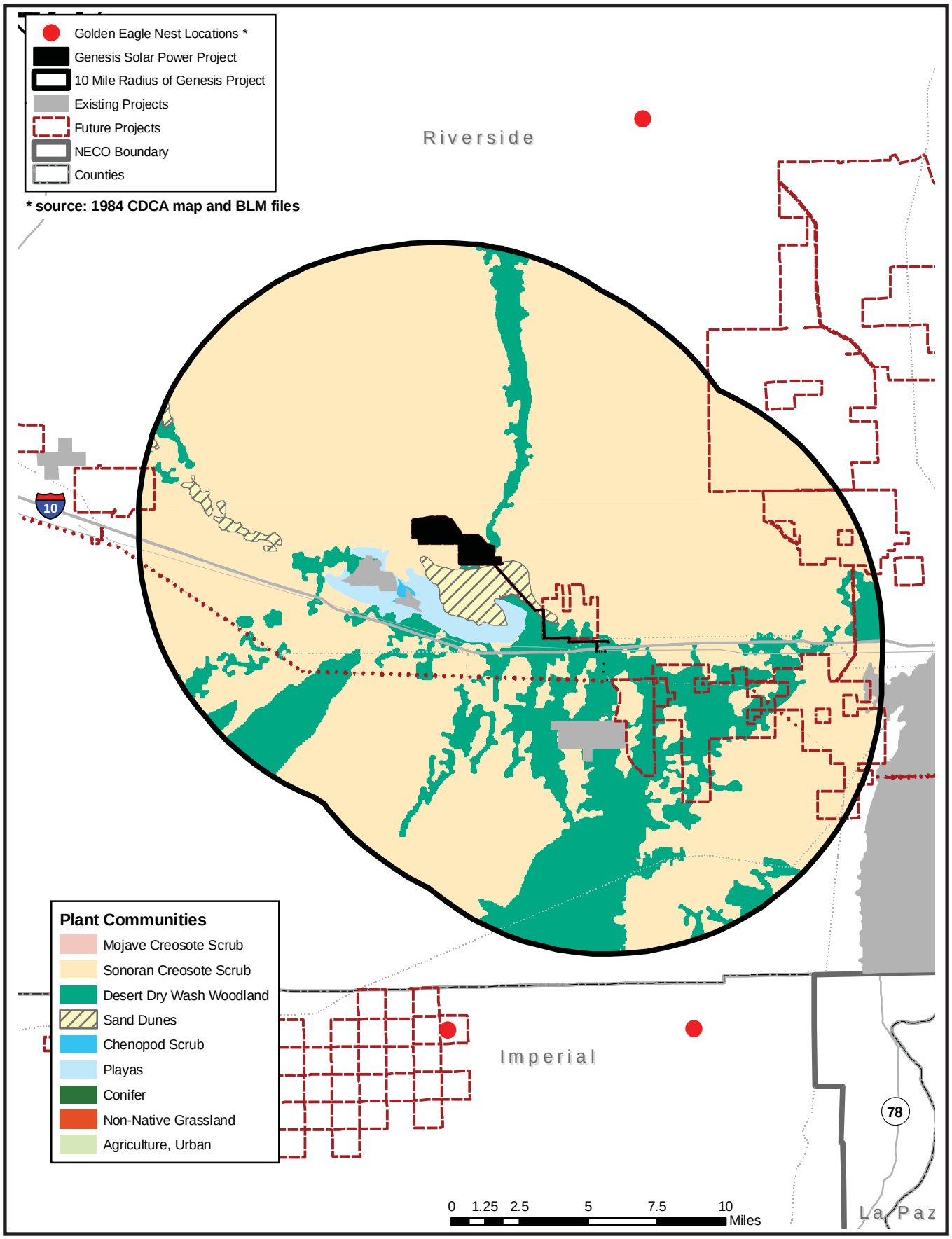


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 11B

Genesis Solar Energy Project - Golden Eagle Foraging Habitat Within 10 Mile Radius of Project

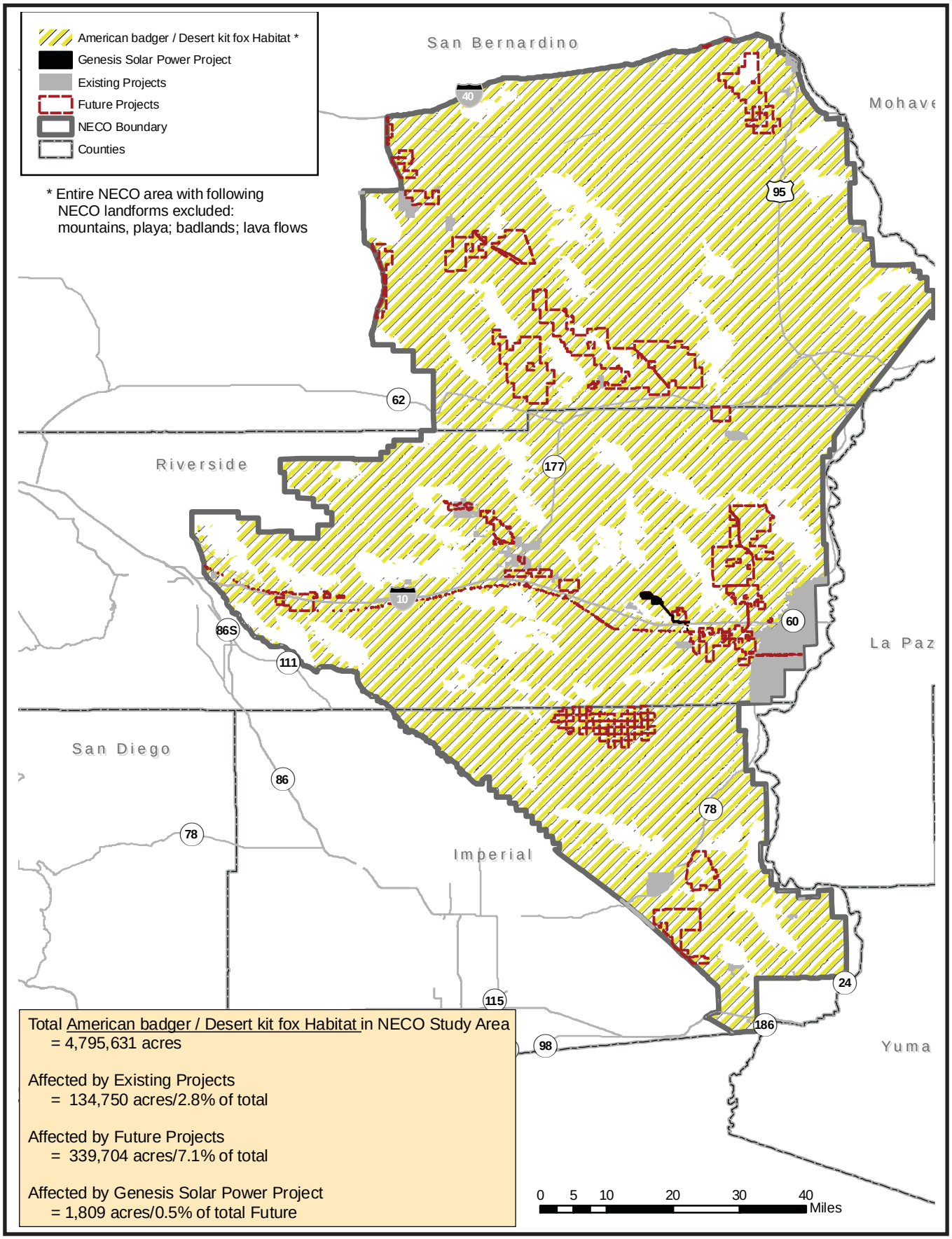


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 12

Genesis Solar Energy Project - American Badger / Desert Kit Fox Habitat

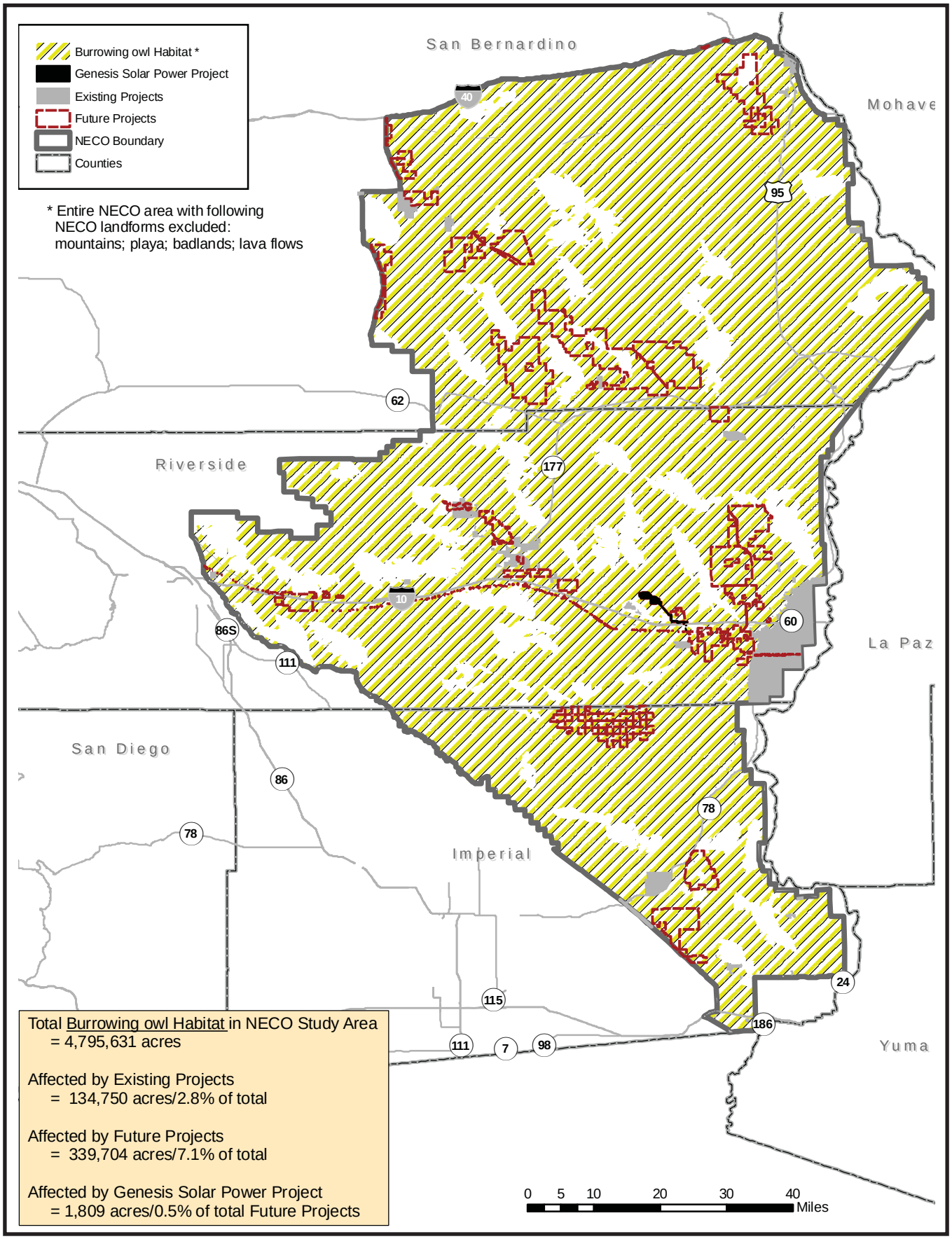


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 13

Genesis Solar Energy Project - Burrowing Owl Habitat

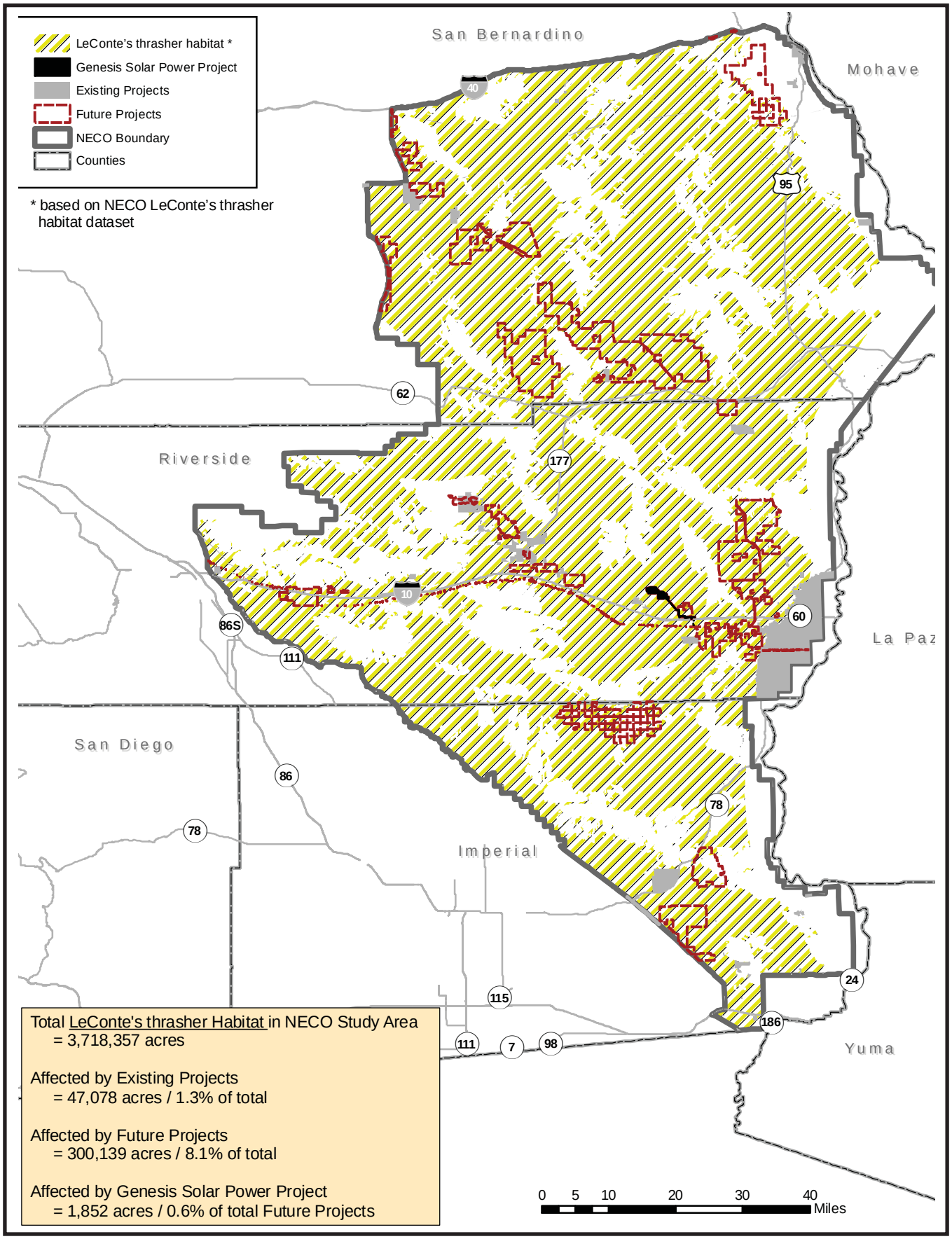


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 14

Genesis Solar Energy Project - Leconte's Thrasher Habitat

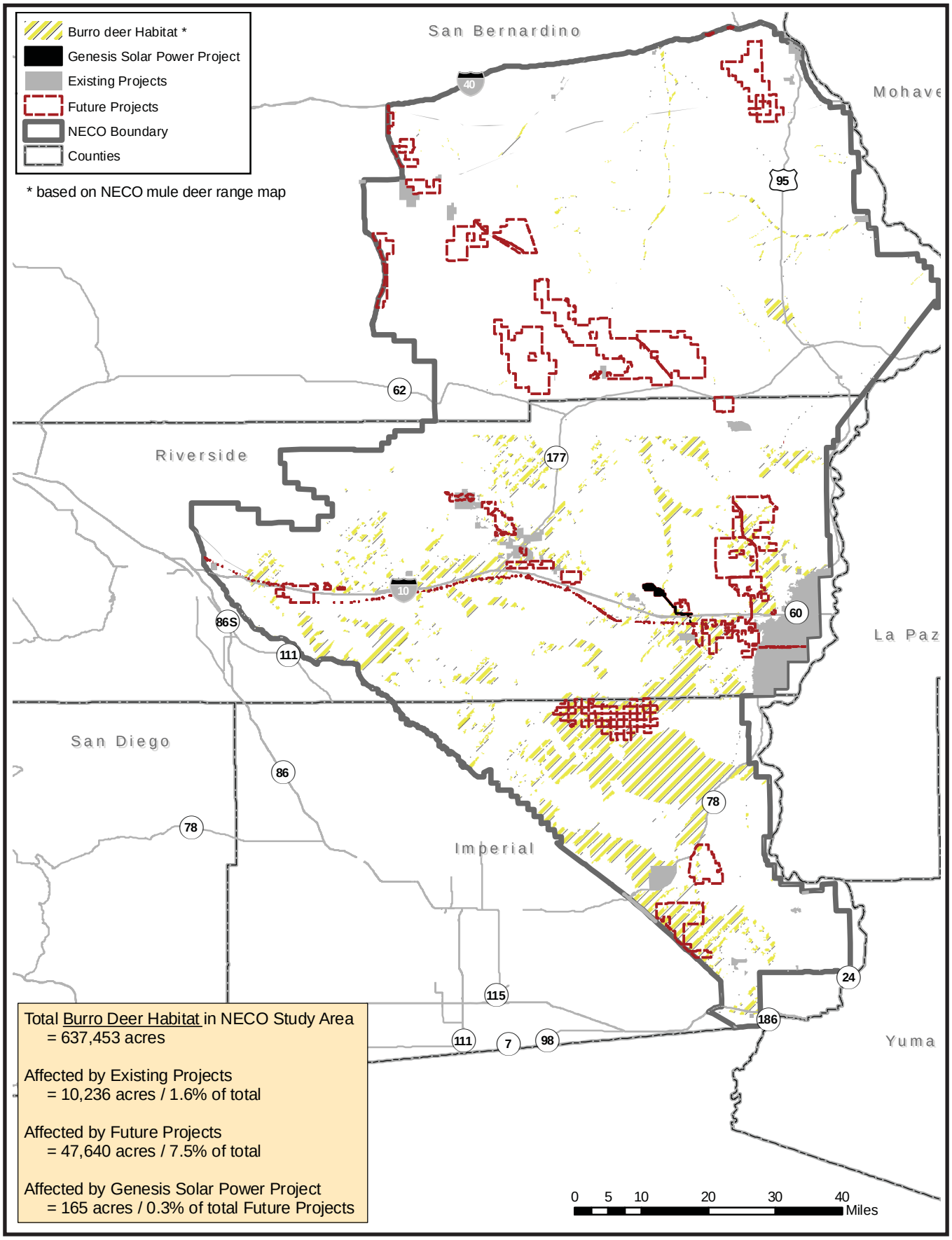


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 15

Genesis Solar Energy Project - Burro Deer Habitat

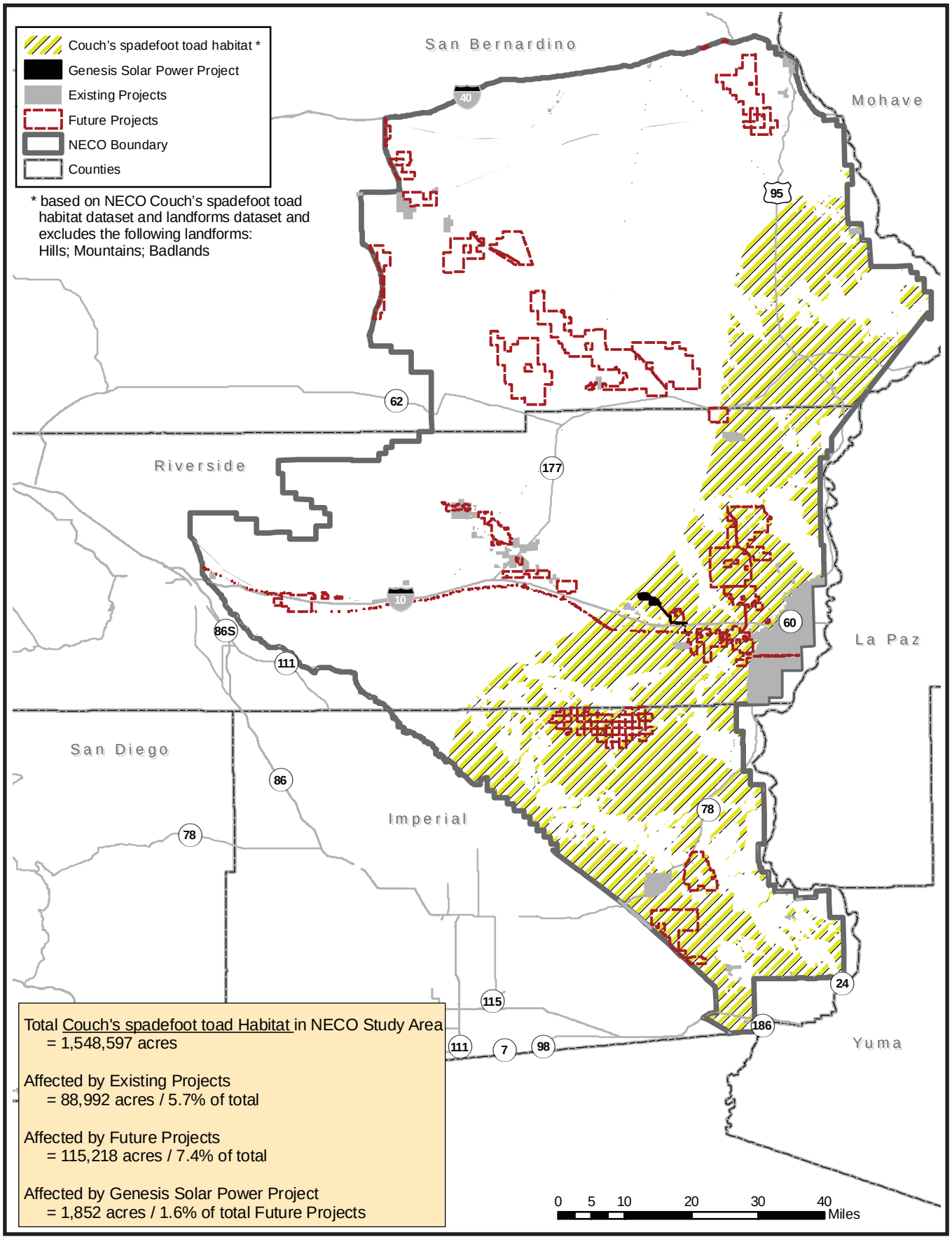


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 16

Genesis Solar Energy Project - Couch's Spadefoot Toad Habitat

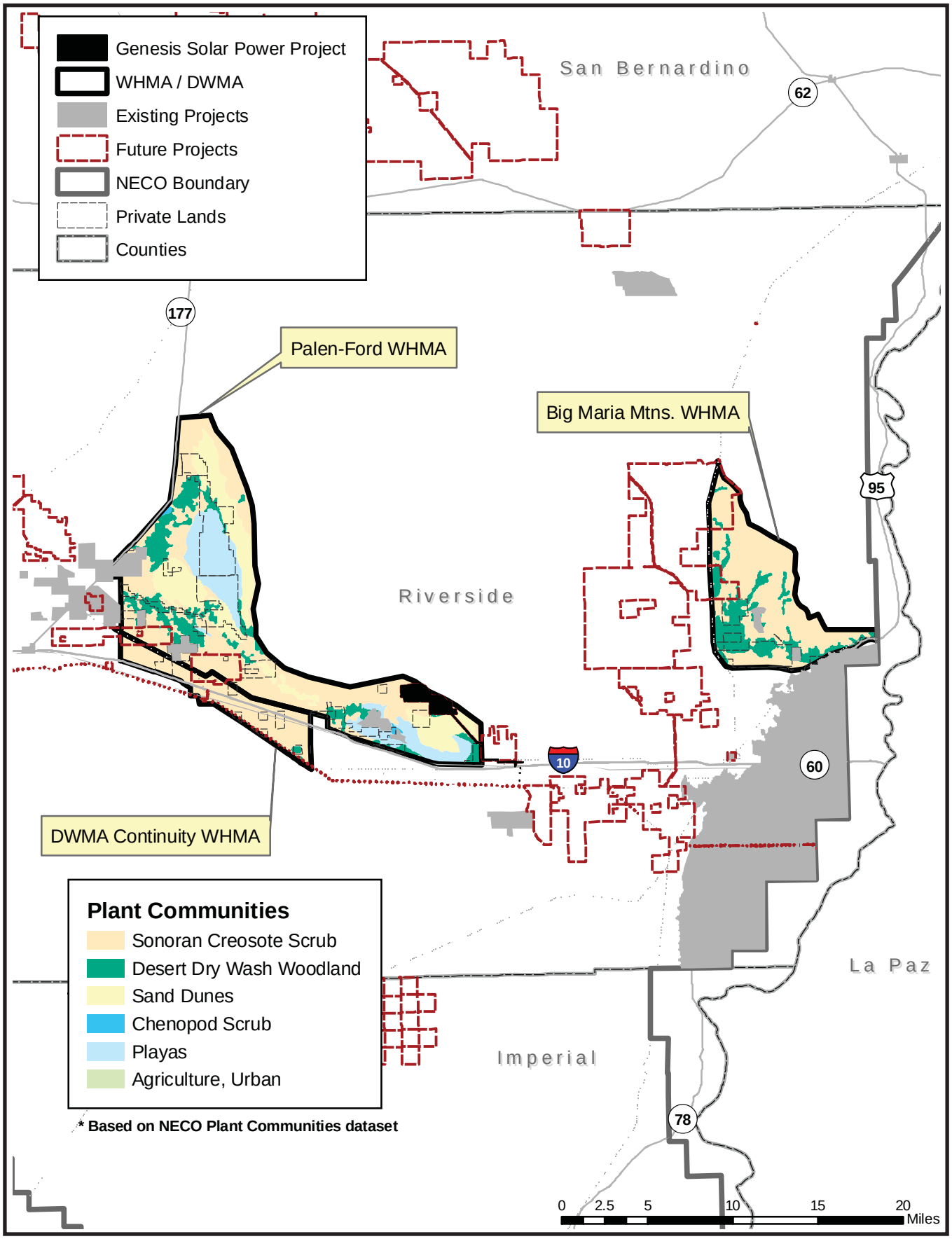


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 17

Genesis Solar Energy Project - Multi-Species WHMAs - Plant Communities

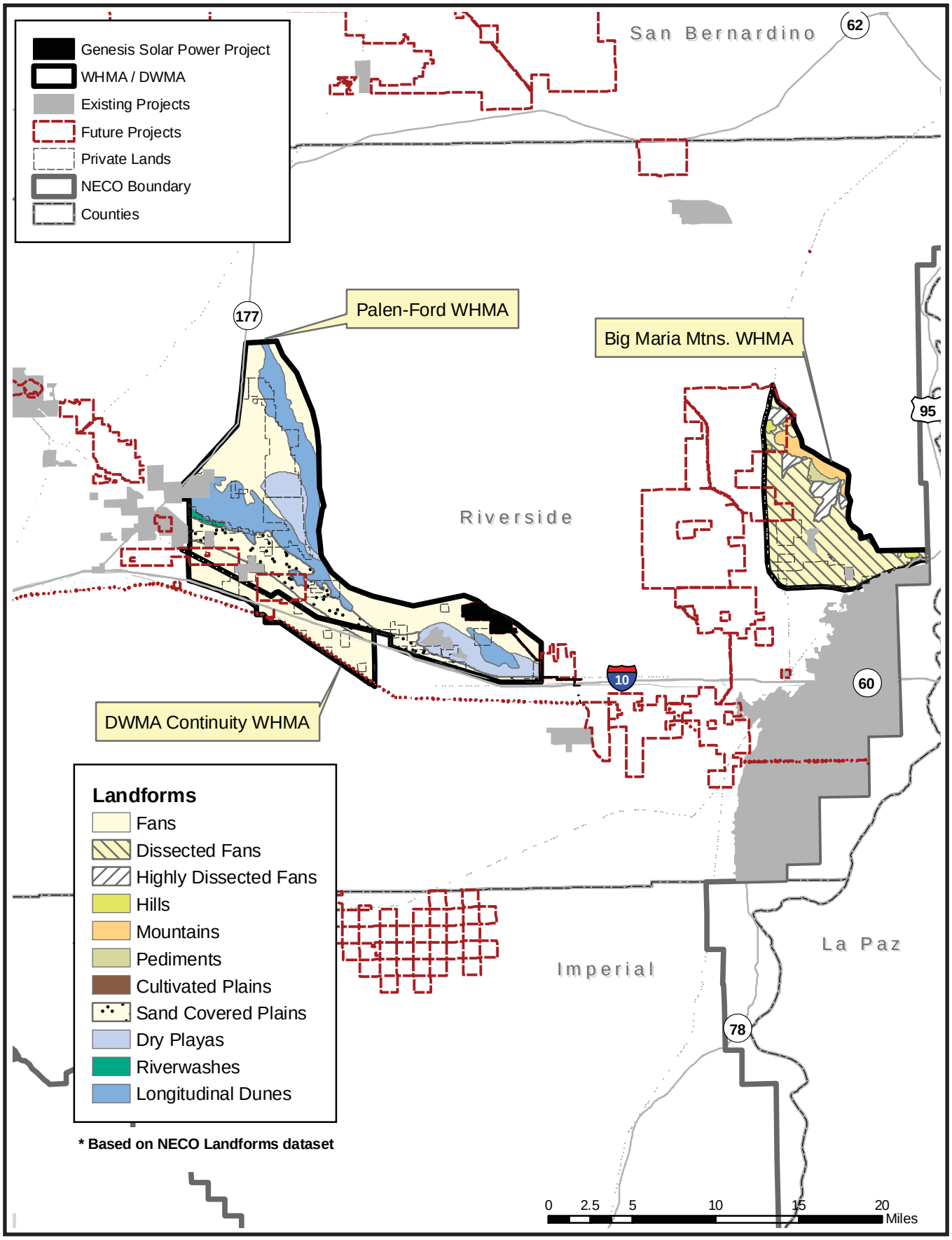


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 18

Genesis Solar Energy Project - Multi-Species WHMAs - Landforms

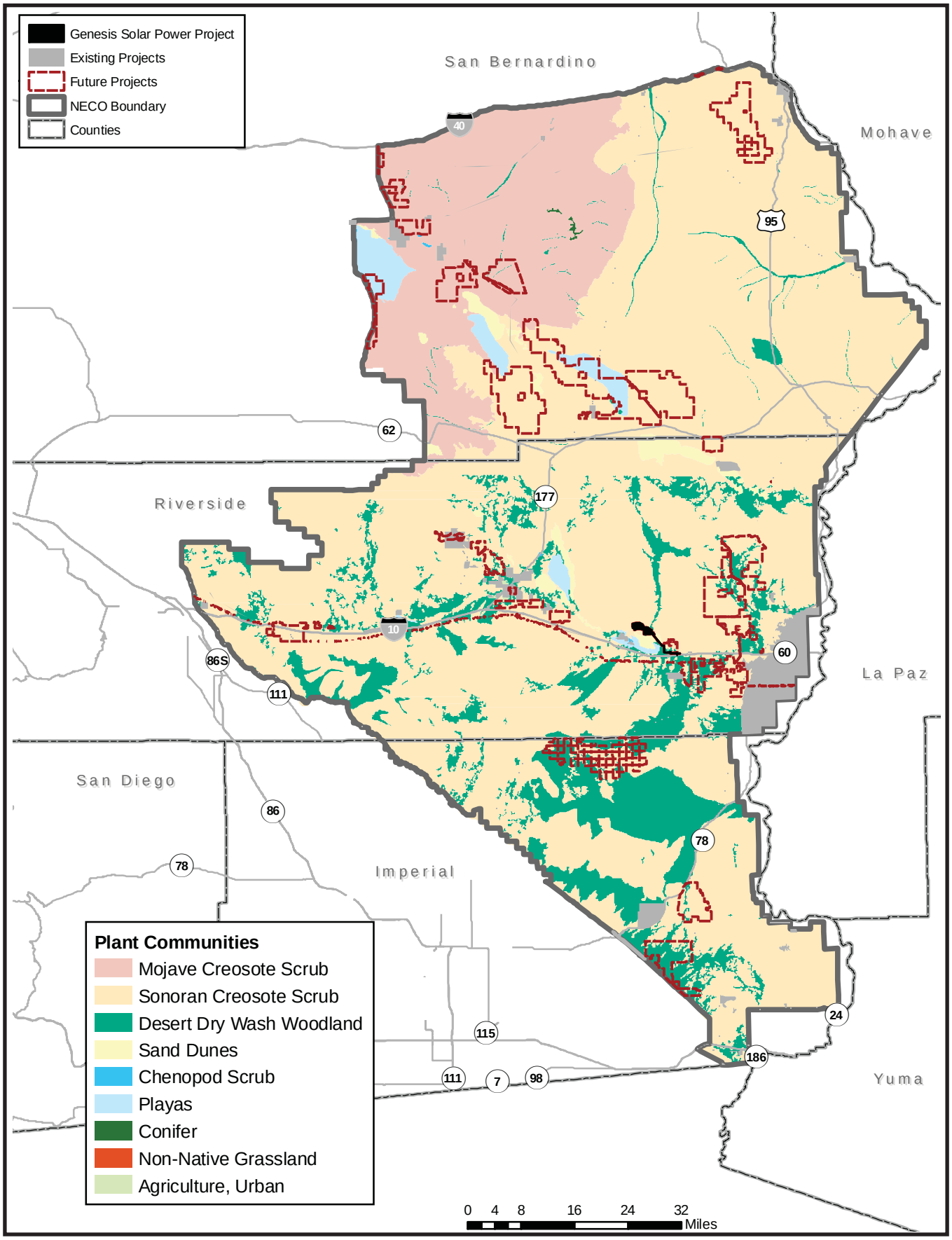


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 19A

Genesis Solar Energy Project - Plant Communities

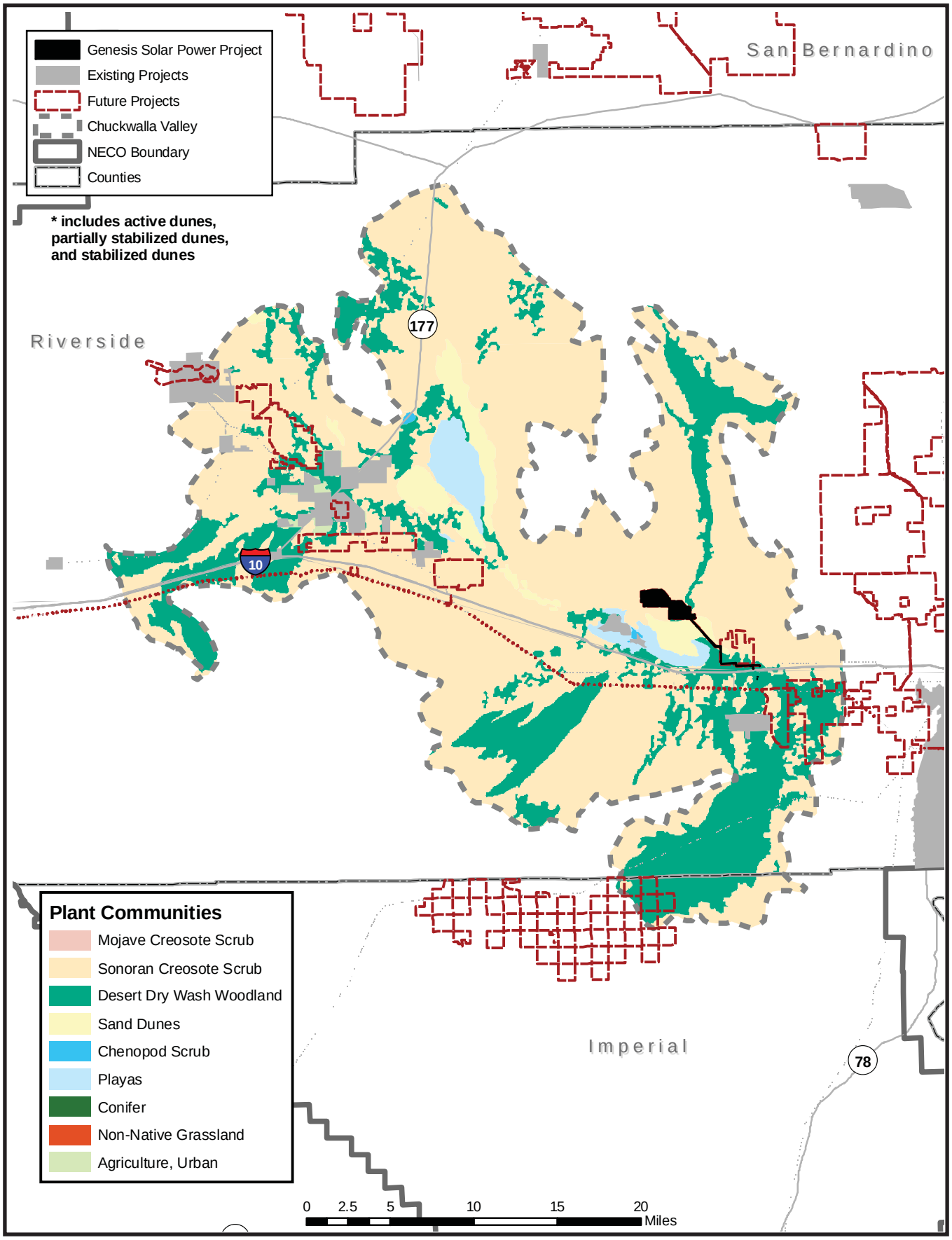


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 19B

Genesis Solar Energy Project - Plant Communities - Chuckwalla Valley

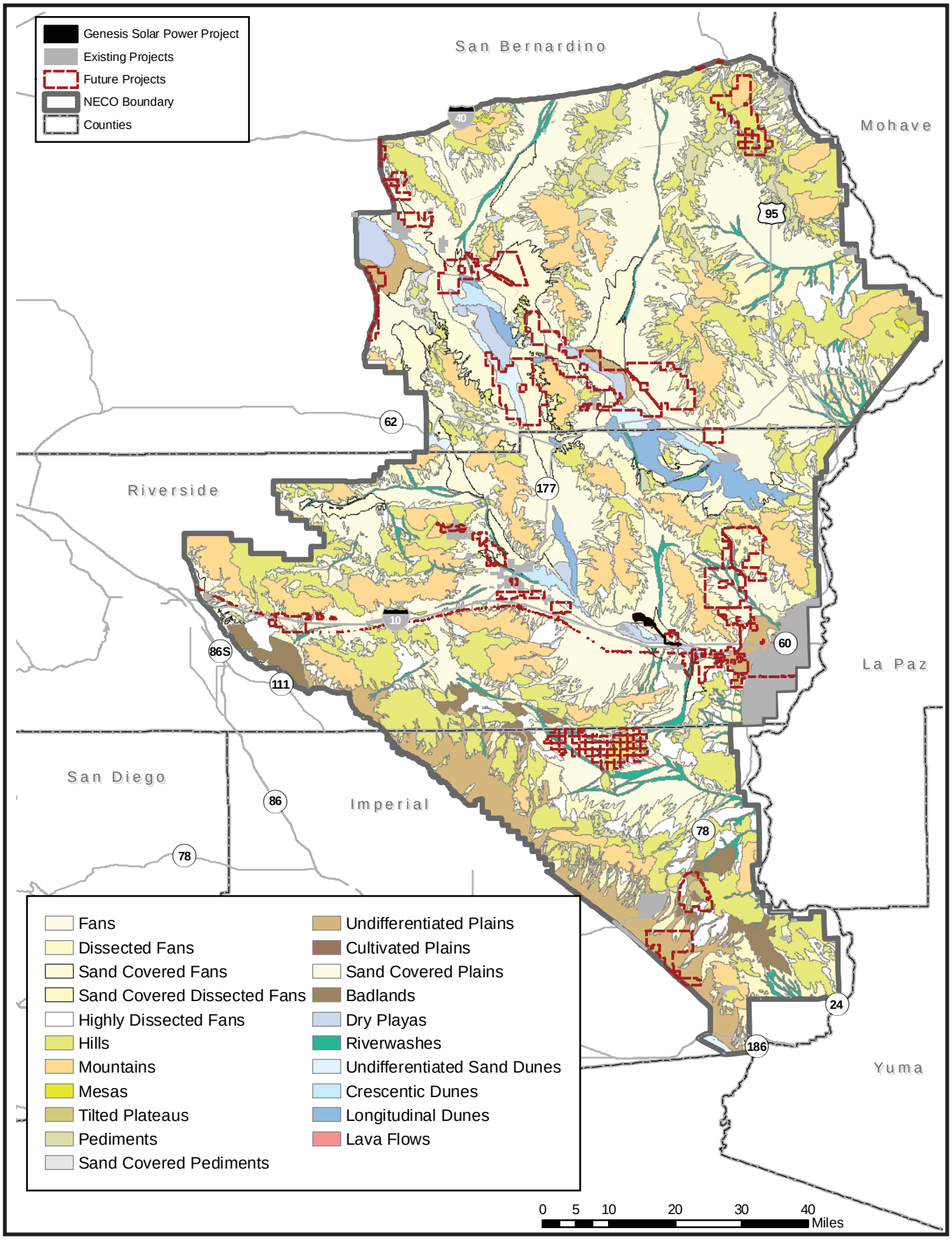


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 20

Genesis Solar Energy Project - Landforms

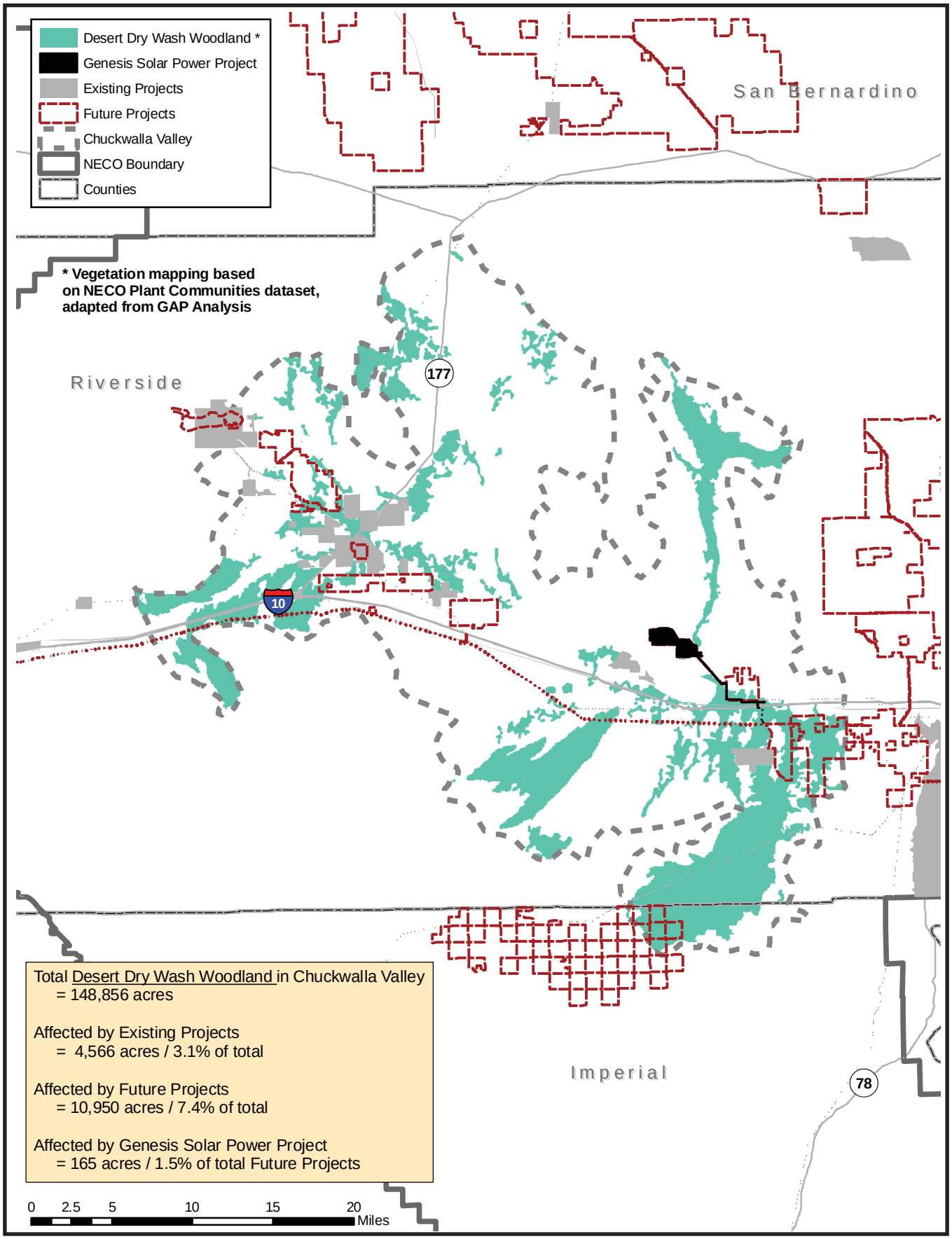


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 21

Genesis Solar Energy Project - Desert Dry Wash Woodland - Chuckwalla Valley

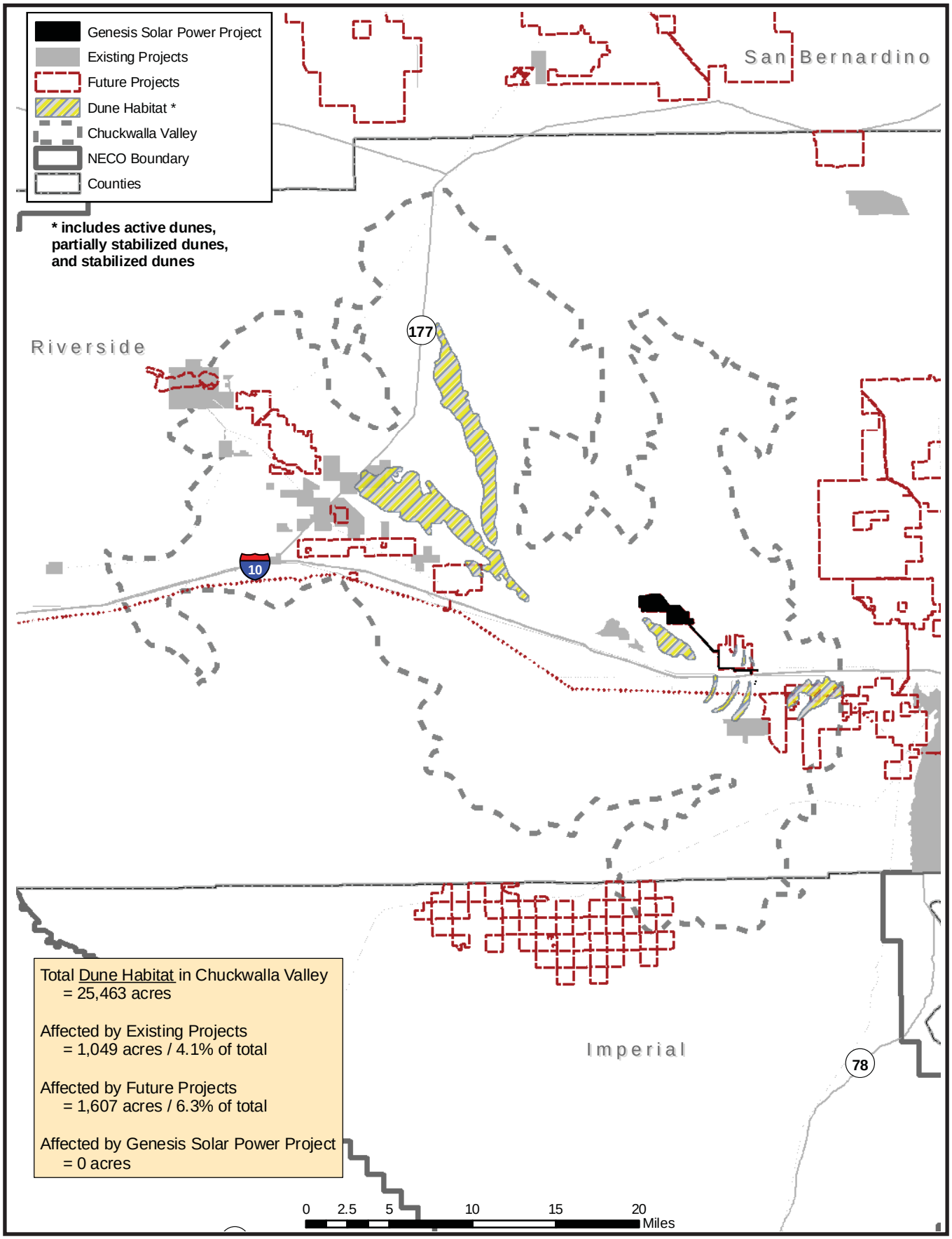


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 22

Genesis Solar Energy Project - Dune Habitat - Chuckwalla

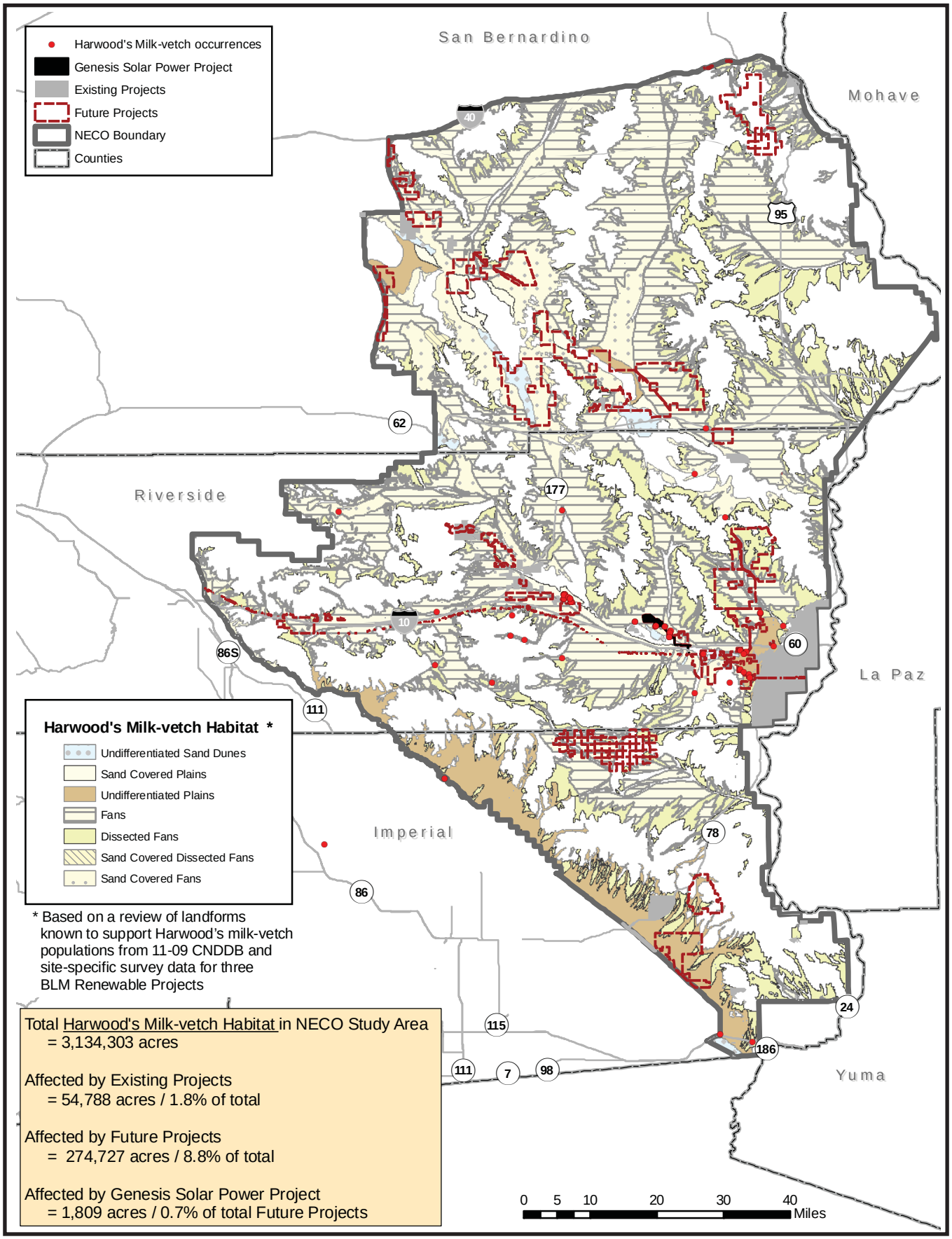


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 23

Genesis Solar Energy Project - Harwood's Milk-Vetch Habitat



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

C.3 CULTURAL RESOURCES AND NATIVE AMERICAN VALUES

The Cultural Resources Section will be included in the Supplemental Staff Assessment.

C.4 – HAZARDOUS MATERIALS MANAGEMENT

Testimony of Alvin Greenberg, Ph.D.

C.4.1 SUMMARY OF CONCLUSIONS

This Revised Staff Assessment contains the Energy Commission staff evaluation of the proposed Genesis Solar Energy Project (GSEP) Application for Certification (AFC) in terms of hazardous materials use. Staff's analysis indicates that with implementation of staff's proposed mitigation measures, hazardous materials use at the site would not present a significant impact to the public. With adoption of the proposed conditions of certification, the proposed project will comply with all applicable laws, ordinances, regulations, and standards. Energy Commission staff proposes conditions of certification to address safe handling of hazardous materials, use of HTF, transportation of hazardous materials, and site security.

C.4.2 INTRODUCTION

The purpose of this Hazardous Materials Management analysis is to determine if the proposed GSEP has the potential to cause significant impacts on the public as a result of the use, handling, storage, or transportation of hazardous materials at the proposed site. If significant adverse impacts on the public are identified, Energy Commission staff must also evaluate the potential for 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 facility. Employers must inform employees of hazards associated with their work and provide them with special protective equipment and training to reduce the potential for health impacts associated with the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes applicable requirements for the protection of workers from these risks.

For this analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The worst case plausible event, regardless of cause, is considered, and analyzed to see whether the risk to local populations is significant. Hazardous material handling and usage procedures are designed to reduce the likelihood of a spill, to reduce its potential size, and to prevent or reduce the potential migration of a spill off site to the extent that there won't be significant off-site impacts. These measures look at potential direct contact from runoff of spills, air-borne plume concentrations, and the potential for spills to mix with runoff water and be carried offsite. Generally, staff seeks to confirm that the applicant has proposed secondary containment basins for containing liquids, and that volatile chemicals would have a restricted exposure to the atmosphere after capture.

Various hazardous materials including mineral and lubricating oils, cleaning detergents, water treatment chemicals, heat transfer fluid (HTF), and welding gasses will be present at the proposed GSEP project. Although the GSEP project will not use natural gas for energy production, natural gas would be supplied to the site for the auxiliary boilers. The

project would connect to a Southern California Edison supply line via a new 6-mile pipeline (GSEP 2009a, Section 3.4.6). The GSEP project would also require the transportation of hazardous materials to the facility. This document addresses all potential impacts associated with the use and handling of hazardous materials.

C.4.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals were evaluated. Staff's analysis addresses the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilized the most current public health exposure levels (both acute and chronic) that are established to protect the public from the effects of an accidental chemical release.

In order to assess the potential for released hazardous materials to travel off site and affect the public, staff analyzed several aspects of the proposed use of these materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by examining the choice and amount of chemicals to be used, the manner in which the applicant will use the chemicals, the manner by which they will be transported to the facility and transferred to facility storage tanks, and the way the applicant plans to store the materials on site.

Staff reviewed the applicant's proposed engineering and administrative controls concerning hazardous materials usage. Engineering controls are the physical or mechanical systems, such as storage tanks or automatic shut-off valves, that can prevent the spill of hazardous material from occurring, or which can either limit the spill to a small amount or confine it to a small area. Administrative controls are the rules and procedures that workers at the facility must follow that will help to prevent accidents or to keep them small if they do occur. Both engineering and administrative controls can act as methods of prevention or as methods of response and minimization. In both cases, the goal is to prevent a spill from moving off site and causing harm to the public.

Staff reviewed and evaluated the applicant's proposed use of hazardous materials as described by the applicant (GSEP 2009a, Section 5.12). Staff's assessment followed the five steps listed below.

- Step 1: Staff reviewed the chemicals and the amounts proposed for on-site use as listed in Table 5.12-1 of the AFC (GSEP 2009a) and determined the need and appropriateness of their use.
- Step 2: Those chemicals proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off site and impact the public were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves

and different-sized transfer-hose couplings and administrative controls such as worker training and safety management programs.

- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials, as reduced by 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 will 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 facility be allowed to use hazardous materials.

LAWS, ORDINANCES, REGULATIONS, 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

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)	Established a nationwide emergency planning and response program and imposed 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 informing 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	The U.S. Department of Transportation (DOT) requirement that suppliers of hazardous materials prepare and implement security plans.
49 CFR Part 1572, Subparts A and B	Requires suppliers of hazardous materials to ensure that all their hazardous materials drivers are in compliance with personnel background security checks.
The Clean Water Act (CWA) (40 CFR	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control,

Applicable Law	Description
112)	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 transportation of natural and other gas by pipeline: annual reports, incident reports, and safety-related condition reports. Requires operators of pipeline systems to notify the DOT of any reportable incident by telephone and then submit a written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gas by pipeline and minimum federal safety standards, specifies minimum safety requirements for pipelines including 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 the requirements for preparing a pipeline integrity management program.
Federal Register (6 CFR Part 27) interim final rule	A regulation of the U.S. Department of Homeland Security that requires facilities that use or store certain hazardous materials to submit information to the department so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
Title 8, California Code of Regulations, section 5189	Requires facility owners to develop and implement effective safety management plans that ensure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the Risk Management Plan (RMP) process.
California Health and Safety Code, section 41700	Requires that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
Hazardous Material Business Plan, Cal HSC Sections	Requires the submittal of a chemical inventory and planning and reporting for management of hazardous materials.

Applicable Law	Description
25500 to 25541; 19 CCR Sections 2720 to 2734	
Hazardous Substance Information and Training Act, 8 CCR Section 339; Section 3200 et seq., 5139 et seq., and 5160 et seq.	Requires listing and implementation of specified control measures for management of hazardous substances.
California HSC 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 Authority (CUPA).
Process Safety Management: Title 8 CCR 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
Local	
Riverside County Fire Code, Riverside County Code Chapter 8.32: Ordinance No. 787	Adopts the California Fire Code, 2007 Edition, with some of its appendices, into Riverside County regulations.
Disclosure of Hazardous Materials and the Formulation of Business Emergency Plans: Riverside County Ordinance 651	Requires disclosure where businesses handle hazardous materials and requires the development of response plans; designates Riverside County Department of Environmental Health as responsible for administration and enforcement of local codes.

The Certified Unified Program Agency (CUPA) with the responsibility to review the Hazardous Materials Business Plan (HMBP) is the Riverside County Environmental Health Department (RCEHD). With regard to seismic safety issues, the site is located in a Seismic Zone 4. Construction and design of buildings and vessels storing hazardous materials will meet the appropriate seismic requirements of the 2007 California Building Code (GSEP 2009a, Section 5.12.2.3).

C.4.4 PROPOSED PROJECT

C.4.4.1 SETTING AND EXISTING CONDITIONS

Several factors associated with the area in which a project is to be located affect the potential for an accidental release of a hazardous material that could cause public health impacts. 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 associated health risks. When wind speeds are low and the atmosphere stable, dispersion is severely reduced but can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the Air Quality section (5.2.1.3) and Appendix B.2 of the Application for Certification (GSEP 2009a).

Terrain Characteristics

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. The topography of the site is essentially flat (about 370 to 400 feet above sea level). Elevated terrain can be found at about 5-6 miles north and northwest of the site boundary where the Palen and McCoy mountains begin (GSEP 2009a, Sections 3.3 and Figure 3.2-1).

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 major bearing on health risk. Sensitive receptors in the project vicinity are listed in Table 5.15-1 of the AFC. There are no sensitive receptors within a 6-mile radius of the project site, and there are no residences or other public receptors within a 4-mile radius of the site (GSEP 2009a, Section 5.15.1). The Chuckwalla Valley and Ironwood State Prisons are located about nine miles south and the nearest schools or medical facilities are in Blythe, about 25 miles away (GSEP 2009a, 5.12.1.1).

C.4.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Small Quantity Hazardous Materials

In conducting the analysis, staff determined in Steps 1 and 2 that some hazardous materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they will be stored in a solid form or in smaller quantities, have low mobility, or have low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are briefly discussed below.

During the construction phase of the project, hazardous materials proposed for use include paint, solvents, gasoline, diesel fuel, motor oil, lubricants, and welding gases (GSEP 2009a, Section 5.12.2.2). No acutely toxic hazardous materials will be used on site during construction, and none of these materials pose significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical state, and/or their environmental mobility. Any impact of spills or other releases of these materials will be limited to the site because of the small quantities involved, their infrequent use (and therefore 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 are all very low volatility and represent limited off-site hazards even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, water treatment chemicals, welding gasses, oils, activated carbon, and other various chemicals (see **HAZARDOUS MATERIALS APPENDIX A** for a list of chemicals proposed to be used and stored at GSEP during operations) would be used and stored in relatively small amounts and represent limited off-site hazards because of their small quantities, low volatility, and/or low toxicity. The project will be limited to using, storing, and transporting only those hazardous materials listed in Appendix A of this section as per staff's proposed condition **HAZ-1**.

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous materials: natural gas and Therminol VP-1™.

Large Quantity Hazardous Materials

Natural Gas

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed of mostly methane, but also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, tasteless and lighter than air. Natural gas can cause asphyxiation when methane is 90% in concentration. Methane is flammable when mixed in air at concentrations of 5-14%, which is also the detonation range. Natural gas, therefore, poses a risk of fire and/or possible explosion if a release occurs under certain specific conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to cause explosions than many other fuel gases such as propane or liquefied

petroleum gas, but can explode under certain confined conditions (as demonstrated by the recent natural gas detonation in Belgium in July 2004).

Natural gas at the proposed facility would be used to fuel the auxiliary boilers. It will not be stored on-site but delivered by Southern California Edison via a new 6-mile pipeline that would connect to an existing main north of I-10 (GSEP 2009a, Section 3.4.6). The risk of a fire and/or explosion on site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) code 85A requires both the use of double-block and bleed valves for gas shut off and automated combustion controls. These measures will significantly reduce the likelihood of an explosion in gas-fired equipment. The safety management plan proposed by the applicant would address the handling and use of natural gas, and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

The natural gas pipeline must be designed to meet the appropriate level of California Public Utilities Commission (CPUC) General Order 112 standards and 49 CFR 192 standards. CPUC General Order 112-E, Section 125.1 requires that at least 30 days prior to the construction of a new pipeline, the owner must file a report with the commission that will include a route map for the pipeline. The natural gas pipeline must be constructed and operated in accordance with the Federal Department of Transportation (DOT) regulations, Title 49, Code of Federal Regulations (CFR), Parts 190, 191, and 192 (see Table 1 LORS). Staff concludes that existing LORS are sufficient to ensure minimal risks of pipeline failure.

Therminol VP-1

Therminol VP1 is the heat transfer fluid (HTF) that will be used in the solar panels to collect solar heat and transfer it in order to generate steam to run the steam turbines. Therminol is a mixture of 73.5% diphenyl ether and 26.5% biphenyl, and is a solid at temperatures below ~54 °F. Therminol can therefore be expected to remain liquid if a spill occurs. While the risk of off-site migration is minimal, Therminol is highly flammable and fires have occurred at other solar generating stations that use it. Approximately 2,000,000 gallons of HTF will be stored at the GSEP contained in the pipes and heat exchanger. Isolation valves would be placed throughout the HTF piping system designed to automatically block off sections of the piping in which a loss of pressure is detected (GSEP 2009a, Section 5.12.2.3).

Staff has assessed the properties of Therminol, and reviewed the record of its use at Solar Electric Generating Stations 8 and 9 at Harper Lake, California. Past leaks, spills, and fires involving this HTF were examined and discussed. It appears that the placement of additional isolation valves in the HTF pipe loops throughout the solar array would add significantly to the safety and operational integrity of the entire system by allowing a loop to be closed if a leak develops in a ball joint, flex-hose, or pipe, instead of closing off the entire HTF system and shutting down the plant. In order to ensure that HTF leaks do not pose a significant risk, staff proposes Condition of Certification **HAZ-4,** which would require the project owner to install a sufficient number of isolation valves that can be either manually or remotely activated.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help to prevent accidents and releases (spills) from moving off site and affecting communities by incorporating engineering safety design criteria in the design of the project. The engineered safety features proposed by the applicant for use at the GSEP project include:

- Storage of small quantity hazardous materials in original, properly labeled containers;
- construction of secondary containment areas surrounding each of the bulk hazardous materials storage areas designed to contain accidental releases that might happen during storage or delivery plus the volume of rainfall associated with a 25-year, 24-hour storm;
- physical separation of stored chemicals in isolated containment areas in order to prevent accidental mixing of incompatible materials, which could result in the evolution and release of toxic gases or fumes;
- installation of a fire protection system for hazardous materials storage areas; and
- continuous monitoring of HTF piping system by plant staff and by automatic pressure sensors designed to trigger isolation valves if a leak is detected.

Administrative Controls

Administrative controls also help prevent accidents and releases (spills) from moving off site and affecting neighboring communities by establishing worker training programs, process safety management programs, and complying with all applicable health and safety laws, ordinances, and standards.

A worker health and safety program will be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY AND FIRE PROTECTION** section for specific regulatory requirements):

- worker training regarding 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 utilizing hazardous materials;
- fire safety and prevention; and
- emergency response actions including facility evacuation, hazardous material spill clean-up, and fire prevention.

At the facility, the project owner will be required to designate an individual with the responsibility and authority to ensure a safe and healthful work place. The project health and safety official will oversee the health and safety program and have the authority to halt any action or modify any work practice to protect the workers, facility, and the surrounding community in the event of a violation of the health and safety program.

Staff's proposed Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in Tables 5.12-1 of the AFC (GSEP 2009a), which have been reviewed by staff to determined 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 Compliance Project Manager. 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.

Additional administrative controls are required by Conditions of Certification **HAZ-2**: preparation of a Hazardous Materials Business Plan, a Process Safety Management Plan, and a Spill Prevention, Control, and Countermeasure Plan) and **HAZ-3** (development of a Safety Management Plan).

On-Site Spill Response

In order to address the issue of spill response, the facility will 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, and prevention equipment and capabilities, as well as other elements. Emergency procedures will 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 Countermeasures (SPCC) Plan. The quantity of oil contained in any one of the planned 230/500 kV transformers would be in excess of the minimum quantity that requires such a plan. However, there are no known waters of the State or of the United States and thus staff's position is that no SPCC Plan is required by 40 CFR 112. However, pursuant to California HSC Sections 25270 through 25270.13, the GSEP 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 Authority (CUPA).

Plant personnel would be trained as a 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 Riverside County Fire Department which has a hazmat response unit capable of handling any incident at the proposed GSEP and would respond in about 1.5-2 hours (GSEP 2009a, Section 5.12.3.2 and RCFD 2010).

Transportation of Hazardous Materials

Various containerized and bulk hazardous materials would be transported to the facility via truck. The applicant estimated that about 15 deliveries of hazardous materials would be required per month during operations (GSEP 2009a, Section 5.11.2.3). In addition, about 2 million gallons of HTF would be transported to the site before construction is complete, requiring roughly 330 deliveries (assuming about 6,000 gallons per tanker). While many types of hazardous materials will be transported to the site, staff believes that transport of HTF poses the predominant risk associated with hazardous materials transport. It should be noted that previous modeling of spills involving much larger quantities of more toxic materials such as aqueous and anhydrous ammonia (two hazardous materials that *would not* be used, stored, or transported to the proposed GSEP) has demonstrated that significant airborne concentrations would only occur at short distances from the spill.

Staff reviewed the applicant's proposed transportation routes for hazardous materials delivery. Trucks would travel on I-10 to the project site via a new access road of short distance. (GSEP 2009a, Section 5.12.2.3). Staff finds that the hazardous materials transportation associated with this project would not significantly increase the risks associated with regional hazardous materials transportation. Furthermore, staff believes it is appropriate to rely upon the extensive regulatory program that applies to the shipment of hazardous materials on California highways to ensure safe handling in general transportation (see Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, DOT regulations 49 CFR subpart H, §172–700, and California Department of Motor Vehicles (DMV) regulations on hazardous cargo). These regulations also address the issue of driver competence.

Staff therefore believes that the risk of exposure to significant concentrations of HTF during transportation to the facility is insignificant because of the remote possibility that an accidental release of a sufficient quantity could be dangerous to the public. The transportation of similar volumes of hazardous materials on the nation's highways is neither unique nor infrequent. Based on the environmental mobility, toxicity, the quantities at the site, and frequency of delivery, it is staff's opinion that HTF poses the predominate risk associated with both use and hazardous materials transportation. Staff concludes that the risk associated with the transportation of other hazardous materials to the site would not increase the risk of overall impact significantly above that associated with HTF transportation alone.

Seismic Issues

It is possible that an earthquake could cause the failure of hazardous materials storage tanks and/or solar field piping. An earthquake could also cause failure of the secondary containment system (berms and dikes), as well as the failure of electrically controlled valves and pumps. The failure of all of these preventive control measures might then result in leaks of chemicals that may cause fires or impact the environment. The applicant stated that the piping in the solar array will be constructed to be flexible and to allow movement (necessary to accommodate thermal expansion). The piping will be attached with ball joints and won't be fixed to a rigid structure; therefore reducing the likelihood of failure during an earthquake (GSEP 2009a, Section 5.12.2.3).

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused both to several large storage tanks and to smaller tanks associated with the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while the newer tanks sustained displacements and failures of attached lines. Staff 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 failed as a result of that earthquake. Staff also conducted an analysis of the codes and standards which should be followed when designing and building storage tanks and containment areas to withstand a large earthquake. Staff notes that the proposed facility will be designed and constructed to the standards of the 2007 California Building Code for Seismic Risk Zone 4 (GSEP 2009a, Section 5.12.2.3). Therefore, on the basis of what occurred in Northridge with older tanks and the lack of failures during the Nisqually earthquake (with newer tanks), staff determined that tank failures during seismic events are not probable and do not represent a significant risk to the public.

Site Security

GSEP proposes to use hazardous materials in sufficient quantities 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), 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. The GSEP will not use or store any chemicals above the threshold levels and therefore the CFATS regulation will not apply and the project owner will not need to submit a “Top Screen” assessment to the DHS. However, 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-5** and **HAZ-6** address both construction security and operations security plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these conditions of certification is to provide the minimum level of security for power plants needed to protect California’s electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the U.S. Department of Energy VAM-CF model, and U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that the GSEP 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, possibly guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach. Site access for vendors would be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner would be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.800 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. The compliance project manager (CPM) may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or NERC, after consultation with appropriate law enforcement agencies and the applicant.

Closure and Decommissioning Impacts and Mitigation

Closure of the proposed GSEP (temporary or permanent) would follow a facility closure plan prepared by the applicant and designed to minimize public health and environmental impacts. Decommissioning procedures would be consistent with all applicable LORS and would include monitoring of hazardous materials storage vessels, safe cessation of processes which use hazardous materials, disposal of hazardous materials and hazardous wastes, and documentation of practices and inventory (GSEP 2009a, Section 5.12.2.4). Staff expects that impacts from the closure and decommissioning process would represent a fraction of the impacts associated with the construction or operation of the proposed GSEP. Therefore based on staff’s analysis for the construction and operation phases of this project, staff concludes that hazardous materials-related impacts from closure and decommissioning of the GSEP would be insignificant.

C.4.4.3 CEQA LEVEL OF SIGNIFICANCE

Staff’s analysis of impacts associated with the storage, use, and handling of hazardous materials at the proposed GSEP has determined that impacts would be below the level of significance if staff’s proposed Conditions of Certification are adopted.

C.4.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so impacts are reduced, and (2) by eliminating the eastern solar field, which is located on flowing desert washes, it would reduce impacts to the sand dune and playa areas and to the Mojave Fringe-toed Lizard habitat. The alternative would also reduce impacts to wildlife movement by reducing obstruction of the Palen wash and would maintain, thru both fluvial and Aeolian processes, the dune and sandy habitats. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.4.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.4.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Potential impacts associated with hazardous materials use during construction and operation of the Reduced Acreage Alternative would likely be reduced compared to those estimated for the GSEP as proposed due to the smaller quantities of hazardous materials required. However, staff's analysis has determined that no significant impacts are expected from the storage and use of hazardous materials at the GSEP as proposed. Therefore staff concludes that with respect to hazardous materials handling, the Reduced Acreage Alternative is not preferable over the project as proposed.

C.4.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance for hazardous materials management would not change with the Reduced Acreage Alternative, as both the project as proposed and the Reduced Acreage Alternative would have impacts below the level of significance. The same conditions of certification would be required for the Reduced Acreage Alternative and the project as proposed.

C.4.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees

Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources and require the same but a lesser amount of cooling water treatment chemicals.

C.4.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.4.6.2 Assessment of Impacts and Discussion of Mitigation

The majority of the hazardous materials use with the Dry Cooling Alternative, including the quantities handled during transportation and disposal, would be the same as those of the proposed project. However, some hazardous materials would be eliminated because they are required specifically for the wet-cooling system, such as sodium hypochlorite used in the cooling tower biological control to control algae growth. Additionally, because the use of water would be reduced from 822 AFY to approximately 66 AFY per 125 MW power block, the use of water treatment chemicals described in Table 5.12-1 of the AFC would also be reduced. As such, hazardous materials usage is expected to decrease with the use of the Dry Cooling Alternative.

C.4.6.3 CEQA Level of Significance

No new impacts related to hazardous materials would be created with use of ACCs in place of cooling towers, and some project impacts would be reduced. The overall impacts of the project with dry cooling would be similar to those of the proposed project since both would have less than significant impacts resulting form the use of hazardous materials.

C.4.7 NO PROJECT/NO ACTION ALTERNATIVE

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

C.4.7.1 NO ACTION ON PROPOSED PROJECT APPLICATION AND ON CDCA LAND USE PLAN AMENDMENT

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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. 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.

C.4.7.2 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAN USE PLAN TO MAKE THE AREA AVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 impacts to hazardous material handling similar to under the proposed project.

C.4.7.3 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAND USE PLAN TO MAKE THE AREA UNAVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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.4.8 CUMULATIVE IMPACTS

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 Figure 1** 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 2, I-10 Corridor 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 I-10 Corridor 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 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 Revised Staff Assessment.

C.4.8.1 GEOGRAPHIC SCOPE OF ANALYSIS

The geographic area considered for cumulative impacts on Hazardous Materials Management is only within the project boundaries.

C.4.8.2 EFFECTS OF PAST AND PRESENT PROJECTS

For this analysis, there are no projects or developments in the area or region that use, store, and/or transport hazardous materials that staff has found to have an impact on the region. The use of hazardous materials is neither frequent nor concentrated in this area. Two power plants that store, use, and transport hazardous materials in the area, the Blythe Power Plants I and II, are not considered by staff to have an impact on the area.

Staff analyzed the potential for hazardous materials cumulative impacts at many other power plant projects. A significant cumulative hazardous materials impact is defined as the simultaneous uncontrolled release of hazardous materials from multiple locations in a form (gas or liquid) that could cause a significant impact where the release of one hazardous material alone would not cause a significant impact. Existing locations that use or store gaseous or liquid hazardous materials, or locations where such facilities might likely be built, were both considered. Staff believes that while cumulative impacts are theoretically possible, they are not probable because of the many safeguards implemented to both prevent and control an uncontrolled release. The chances of one uncontrolled release occurring are

remote. The chance of two or more occurring simultaneously, with resulting airborne plumes mingling to create a significant impact, are even more remote. Staff believes the risk to the public is insignificant.

The applicant will develop and implement a hazardous materials handling program for the GSEP independent of any other projects considered for potential cumulative impacts. Staff believes that the facility, as proposed by the applicant and with the additional mitigation measures proposed by staff, poses a minimal risk of accidental release that could result in off-site impacts. It is unlikely that an accidental release that has very low probability of occurrence (about one in one million per year) would independently occur at this site and another facility at the same time. Therefore, staff concludes that the facility would not contribute to a significant hazardous materials-related cumulative impact.

C.4.8.3 EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

Hazardous Materials Management at the proposed project are also not expected to be affected by any reasonably foreseeable future projects, including the proposed Blythe and Palen solar projects proposed for the I-10 corridor. The reasons for staff's position are described above.

Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction. The construction of GSEP is not expected to result in short term adverse impacts related to hazardous materials use. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the GSEP, however, short term impacts related to Hazardous Materials Management during construction of those cumulative projects are not expected to occur.

Operation. The operation of the GSEP is not expected to result in long term adverse impacts related to Hazardous Materials Management even though it is expected that some of the cumulative projects described above may be operational at the same time as the GSEP.

Decommissioning. The decommissioning of the GSEP is not expected to result in adverse impacts related to Hazardous Materials Management. 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, it is not expected that significant impacts related to Hazardous Materials Management during decommissioning of the GSEP generated by the cumulative projects will occur.

C.4.12 RESPONSE TO AGENCY AND PUBLIC COMMENTS

One comment has been received in writing from Intervener CURE on the topic of hazardous materials management and several other questions were posed by CURE and answered by staff at the April 29, 2010 staff workshop in Palm Springs. In a letter dated May 13, 2010 CURE stated the mitigation measures for impacts from HTF spills are completely inadequate to address HTF that sits on top of the soil, to address off-site consequences of HTF spills and to address consistency with LORS, among others. CURE further claimed that proposed Condition of Certification **HAZ-4** requires that the Applicant place an "adequate number" of isolation valves in the heat transfer fluid pipe loops to ensure that heat transfer fluid leaks do not pose a significant risk. However, the source of such spills is the valves themselves. Thus, the SA/DEIS fails to provide any analysis to substantiate that this measure would in any way mitigate impacts from HTF spills. Thus, significant impacts from heat transfer fluid leaks remain significant and unmitigated.

Response: Staff disagrees with CURE's contention that the mitigation is inadequate. First, the mitigation for HTF-contaminated soil can be found in the WASTE MANAGEMENT section of the Revised SA. Second, the isolation valves must be paced so as to limit any loss to the air or ground to 1250 gallons of HTF. Since HTF operates at elevated temperature and pressure, much of the fluid leaked would be dispersed in the air. The remained would fall to the ground and either remain a liquid or if the ambient temperature was less than 54° F, it would become a solid, this limiting its mobility and spread. And third, staff disputes the notion that the sources of significant spills are the "valves themselves". The valves are a source of fugitive emissions but it is a rupture of a pipe or flex-arm that would result in a significant leak.

C.4.8.4 OVERALL CONCLUSION

The potential for off-site impacts resulting from hazardous materials use at the GSEP is insignificant due to the nature of the materials used and the engineering and administrative controls that would be implemented to prevent and control accidental releases of hazardous materials. Because of this determination, and the additional fact that there are no existing or future foreseeable facilities in the immediate proximity (less than 1 mile) using large amounts of hazardous chemicals, there is little (if any) possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk should an accidental release occur.

C.4.9 COMPLIANCE WITH LORS

Staff concludes that construction and operation of the GSEP project would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of hazardous materials management.

C.4.10 NOTEWORTHY PUBLIC BENEFITS

The construction and operation of a solar power plant such as the proposed GSEP requires in general smaller quantities of hazardous materials and materials that are less dangerous to the public than a natural-gas fired power plant. Building solar power plants to supply the required energy in California therefore benefits the public by reducing the risks otherwise associated with the use and transport of large quantities of more hazardous materials such as aqueous or anhydrous ammonia.

C.4.10 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

HAZ-1 The project owner shall not use any hazardous materials not listed in Appendix A, below, or in greater quantities or strengths than those identified by chemical name in Appendix A, below, 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 Spill Prevention, Control, and Countermeasure Plan (SPCC), and a Process Safety Management Plan (PSMP) to the Riverside County Environmental Health Department (RCEHD) and the CPM for review. After receiving comments from the RCEHD and the CPM, the project owner shall reflect all recommendations in the final documents. Copies of the final HMBP shall then be provided to the RCEHD for information and to the CPM for approval.

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

HAZ-3 The project owner shall develop and implement a Safety Management Plan for the delivery and handling 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 The project owner shall place an adequate number of isolation valves in the Heat transfer Fluid (HTF) pipe system for section and loop isolation in the event of a fluid leak. These valves shall be actuated either manually or remotely depending on location and function. The engineering design

drawings showing the number, location, and type of isolation valves shall be provided to the CPM for review and approval prior to the commencement of the solar array piping construction.

Verification: At least thirty (30) days (or less if agreed to by the CPM) prior to the commencement of solar array piping construction, the project owner shall provide the design drawings as described above to the CPM for review and approval.

HAZ-5 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-6 The project owner shall also prepare a site-specific security plan for the commissioning and operational phases that will be available to the CPM for review and approval. The project owner shall implement site security measures that address 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 or wall, at least eight feet high and topped with barbed wire or the equivalent;
2. main entrance security gate, either hand operated 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;

   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 determine the accuracy of employee identity and employment history and shall be conducted in accordance with state and federal laws 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 contractors who visit the project site;

6. site access controls for employees, contractors, vendors, and visitors;

7. a statement(s) (refer to sample, **ATTACHMENT C**), signed by the owners or authorized representative of hazardous materials transport vendors, certifying that they have prepared and implemented security plans in compliance with 49 CFR 172.802, and that they have conducted employee background investigations in accordance with 49 CFR Part 1572, subparts A and B;

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(s) present 24 hours per day, 7 days per week; **<u>or</u>**

   B. power plant personnel on site 24 hours per day, 7 days per week,

      <u>and</u> the CCTV able to view 100% of the entire solar array fenceline perimeter

      <u>or</u> breach detectors **<u>or</u>** on-site motion detectors along the entire solar array fenceline.

The project owner shall fully implement the security plans and obtain CPM approval of any substantive modifications to those security plans. The CPM may authorize modifications to these measures, or may require additional

measures such as protective barriers for critical power plant components—transformers, gas lines, and compressors—depending upon 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 both appropriate law enforcement agencies and the applicant.

Verification: At least thirty (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 that updated certification statements have been 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.

C.4.12 CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use, storage, and transportation would not pose a significant impact on the public. Staff's analysis also shows that there would be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. Other proposed conditions of certification address the issues of site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and would protect the public from significant risk of exposure to an accidental release of hazardous materials. If all mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials would not present a significant risk to the public.

Staff concludes that there is insignificant potential for hazardous materials release to have an impact beyond the facility boundary, and therefore concludes there is also insignificant potential for significant impacts to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to the **Biological Resources**, **Air Quality**, **Soil and Water Resources**, and/or the **Waste Management** sections of this Revised Staff Assessment.

Staff proposes six conditions of certification which are mentioned in the text above. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in **Appendix A** of this section, unless there is prior approval by the Energy Commission Compliance Project Manager. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of

the project 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. **HAZ-4** addresses the use of HTF in the solar array. Site security during both the construction and operation phases is addressed in **HAZ-5** and **HAZ-6.**

SAMPLE CERTIFICATION (Attachment A)

Affidavit of Compliance for Project Owners

I,

_____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____

(Company name)

for employment at

_____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

_____

(Signature of officer or agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment B)

Affidavit of Compliance for Contractors

I,

_____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____

(Company name)

for contract work at

_____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

_____

(Signature of officer or agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment C)

Affidavit of Compliance for Hazardous Materials Transport Vendors

I,

_____

(Name of person signing affidavit)(Title)

do hereby certify that the below-named company has prepared and implemented security plans in conformity with 49 CFR 172.880 and has conducted employee background investigations in conformity with 49 CFR 172, subparts A and B,

_____

(Company name)

for hazardous materials delivery to

_____

(Project name and location)

as required by the California Energy Commission Decision for the above-named project.

_____

(Signature of officer or agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

C.4.13 REFERENCES

GSEP 2009a – Genesis Solar Energy Project/T. Bernhardt (tn:53083) Application for Certification for the Genesis Solar Energy Project. 08/31/2009

GSEP 2009f – Genesis Solar Energy Project/T. Bernhardt (tn:54453) Data Responses Set 1A (# 1-227) for the Genesis Solar Energy Project. 12/15/2009

North American Electric Reliability Council (NERC) 2002. Security Guidelines for the Electricity Sector, Version 1.0, June 14, 2002.

Riverside County Fire Department – (tn: 54769) Letter from Captain Jason Newman, Strategic Planning Division. 1/07/10

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HAZARDOUS MATERIALS
APPENDIX A

Hazardous Materials Proposed for Use at the GSEP

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Hazardous Materials Appendix A

Hazardous Materials Proposed for Use at the GSEP

Material	CAS No.	Application	Hazardous Characteristics	Maximum Quantity On Site	CERCLA SARA RQ[a]
Acetylene	74-86-2	Welding gas	Health: moderate toxicity Physical: toxic	600 cubic feet	
Argon	7440-37-1	Welding gas	Health: low toxicity Physical: non-flammable gas	600 cubic feet	
Carbon Dioxide			Health: low toxicity Physical: non-flammable gas	15 tons	
Diesel Fuel		Equipment refueling and emergency diesel fire pump	Health: low toxicity Physical: combustible liquid	3,600 gallons	
Fertilizer Monopotassium Phosphate		Treatment of HTF contaminated soil	Health: low toxicity Physical: irritant	250 pounds	
Fertilizer Urea		Treatment of HTF contaminated soil	Health: low toxicity Physical: N/A	250 pounds	
Hydraulic Fluid		High-pressure combustion turbine starting system, turbine control valve actuators	Health: low to moderate toxicity Physical: Class IIIB combustible liquid	500 gallons in equipment, maintenance inventory of 110 gallons in 55-gallon steel drums	
Hydrogen		Steam turbine generator cooling	Health: low toxicity Physical: flammable gas	20,000 SCF	
Lube Oil		Lubricate rotating equipment (e.g., gas turbine and steam-turbine bearings)	Health: low toxicity Physical: N/A	10,000 gallons in equipment and piping, additional maintenance inventory of up to 550 gallons in 55-gallon steel drums	
Mineral Insulating Oil		Transformers/switchyard	Health: low toxicity Physical: N/A	32,000	
Natural Gas (Methane)	74-82-8	Auxiliary boiler operation	Health: low toxicity Physical: flammable gas	No on-site storage, up to 140 pounds of natural gas in equipment and piping	
Nitrogen	7727-37-9		Health: low toxicity Physical: flammable gas	7,500 pounds	
Material	**CAS No.**	**Application**	**Hazardous Characteristics**	**Maximum Quantity On Site**	**CERCLA SARA RQ[a]**

Oxygen	7782-44-7	Welding gas	Health: low toxicity Physical: oxidizer	600 cubic feet	
Sodium Hypochlorite (12.5%)		Cooling tower biological control	Health: high toxicity Physical: Poison-B, corrosive	8,500 gallons	100 pounds
Sulfur Hexaflouride		230-kV breaker insulating medium	Health: none Physical: none		
Sulfuric Acid (29.5%) solution			Health: high toxicity Physical: corrosive and water reactive	2,000 gallons	1,000 pounds
Sulfuric Acid (93%) solution			Health: high toxicity Physical: corrosive and water reactive	8,500 gallons	1,000 pounds
Therminol VP-1 Diphenyl Ether (73.5%) Biphenyl (26.5%)		Heat transfer fluid in the solar array	Health: moderate toxicity Physical: irritant; combustible liquid (Class III-B)	2.0 MM gallons	100 pounds
Water Treatment Chemical NALCO Tri-Act 1800 Cyclohexlyamine (5 – 10%) Monoehtanolamine (10 – 30%) Methoxyproplyamine (10 – 30%)			Health: high toxicity Physical: corrosive, class II combustible liquid	800 gallons	
Water Treatment Chemical NALCO Elimin-Ox Carbohydazide (5 – 10%)			Health: moderate toxicity Physical: corrosive	800 gallons	
Water Treatment Chemical NALCO 3D Trasar 3DT185 Phosphoric Acid (60 – 100%)			Health: high toxicity Physical: corrosive	800 gallons	
Water Treatment Chemical NALCO 3D Trasar 3DT177 Phosphoric Acid (30%)			Health: moderate toxicity Physical: irritant	800 gallons	
Material	**CAS No.**	**Application**	**Hazardous Characteristics**	**Maximum Quantity On Site**	**CERCLA SARA RQ[a]**
Water Treatment Chemical NALCO 3D Trasar 3DT190			Health: low toxicity Physical: irritant	800 gallons	

Water Treatment Chemical NALCO Acti-Brom ® 7342 Sodium Bromide			Health: low toxicity Physical: irritant	800 gallons	
Water Treatment Chemical NALCO pHreedom ® 5200M Sodium salt of phosphonomethylated diamine			Health: low to moderate toxicity Physical: irritant	800 gallons	
Water Treatment Chemical NALCO PCL-1346			Health: low toxicity Physical: irritant	800 gallons	
Water Treatment Chemical NALCO Permacare ® PC-7408 Sodium Bisulfite			Health: low toxicity Physical: irritant	800 gallons	
Water Treatment Chemical NALCO BT-3000 Sodium Hydroxide Sodium Tripolyphosphate			Health: high toxicity Physical: corrosive	800 gallons	
Water Treatment Chemical NALCO 8338 Sodium Nitrate Sodium Tolytriazole Sodium Hydroxide			Health: moderate toxicity Physical: toxic	800 gallons	

Source: GSEP 2009a Table 5.12-1
a. Reportable quantities for a pure chemical, per the Comprehensive Environmental Response, Compensation, and Liability Act.

C.5 - HEALTH AND SAFETY

Testimony of Alvin Greenberg, Ph.D.

C.5.1 SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) have analyzed potential public health risks associated with construction and operation of the Genesis Solar Energy Project (GSEP) and does not expect there would be 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 GSEP project was based on 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 GSEP would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area.

C.5.2 INTRODUCTION

The purpose of this Revised Staff Assessment (RSA) is to determine if emissions of toxic air contaminants (TACs) from the proposed GSEP project would have the potential to cause significant adverse public health impacts or to violate standards for public health protection. If potentially significant health 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 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 impacts from GSEP 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 GSEP 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 GSEP 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.5.3 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, the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA (CEQ NEPA Regulations) 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. CEQ NEPA Regulations requires that an Environmental Impact Statement (EIS) be prepared when a proposed major 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 NEPA implementing regulations 40 CFR Part 1508.27.

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

The **PUBLIC HEALTH** section of this 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 GSEP 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 (ARB) 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 for this project addresses two categories of health impacts: chronic (long-term) noncancer effects, and cancer risk (also long-term). Since the only TAC emitted from this project would be diesel particulate from emergency diesel-fueled engines, and since only long-term health effects have been established for diesel particulate, no acute (short-term) health effects are calculated for this project.

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 percent to 100 percent 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 1993) 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 for this project are evaluated for 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 these categories.

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. 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 the MDAQMD in Rule 1320.

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, 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

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 have a natural tendency to cause injury or damage to business or property.”
California Health and Safety Code Sections 44300 et seq.	Air Toxics Hot Spots Program requires participation in the inventory and reporting program at the District level.
California Health and Safety Code Sections 44360 - 44366	Air Toxics Hot Spots Information and Assessment Act requires that based on results of an HRA conducted per CARB/OEHHA guidelines, toxic contaminants do not exceed acceptable levels.
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 1320	Requires the use of BACT and T-BACT at certain projects and the preparation of an HRA.

C.5.4 PROPOSED PROJECT

C.5.4.1 SETTING AND EXISTING CONDITIONS

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Features 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, affects public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality, existing public health concerns, and environmental site contamination.

Site and Vicinity Description

The proposed facility would be located in the Mojave Desert portion of eastern Riverside County, approximately 25 miles west of Blythe and 5 air miles north of I-10. The topography of the site is essentially flat (about 370 to 400 feet above sea level). Land uses in the project vicinity include undeveloped desert, wilderness, and agricultural uses. Elevated terrain can be found at about 5-6 miles north and northwest of the site boundary where the Palen and McCoy mountains begin (GSEP 2009a, Sections 3.3 and Figure 3.2-1).

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. Sensitive receptors in the project vicinity are listed in Table 5.15-1 of the AFC. There are no sensitive receptors within a 6-mile radius of the project site, and there are no residences or other public receptors within a 4-mile radius of the site (GSEP 2009a, Section 5.15.1). The Chuckwalla Valley and Ironwood State Prisons are located about nine miles south and the nearest schools or medical facilities are in Blythe, about 25 miles away (GSEP 2009a, 5.12.1.1).

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.

This region of Riverside County (part of the Mojave Desert) is characterized by a dry-hot desert climate; summers are hot and dry, winters are moderate with low precipitation, and temperature inversions are strong. The region typically experiences over 345 sunny days per year. Winds generally flow from the south and southwest across the region and tend to transport air pollutants from the Los Angeles area into the Mojave Desert Air Basin (GSEP 2009a, section 5.2.1.3).

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 concentration levels from representative air monitoring sites in the project vicinity 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 from all causes is about 1 in 3, or 333,000 in one million. For the year 2004, the American Cancer Society estimated that the death rate due to cancer was 23.1 percent, about 1 in 4.

The California Air Resources Board (CARB) published a report on emissions and air quality in the state of California in 2008, showing that concentrations of the top ten toxic air contaminants (TAC) and their associated health risk have been substantially reduced since 1990. The concentrations of TACs estimated for the Mojave Desert Air Basin (MDAB) during 2008 are presented in AFC Table 5.15-2 (GSEP 2009a), which shows that diesel PM, formaldehyde, benzene, and acetaldehyde contribute the majority of TAC emissions in the MDAB.

There are no monitoring stations within the MDAB that actively report TACs, and therefore the background cancer risk in the MDAB cannot be determined. The nearest CARB air toxics monitoring station that actively reports values is located in Calexico, 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 serves to show the upper-bound levels of toxic air contaminants found in the region. In 2008, the background cancer risk calculated by CARB for the Calexico monitoring station was about 135 in one million (CARB 2009). The pollutants 1,3-butadiene and benzene, emitted primarily from mobile sources, accounted together for more than half of the total risk. The risk from 1,3-butadiene was about 43 in one million, while the risk from benzene was about 44 in one million. Formaldehyde accounts for about 13% of the 2008 average calculated cancer risk based on air toxics monitoring results, with a risk of about 18 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources, such as the proposed facility. The risk from hexavalent chromium was about 14 in one million, or ~10 percent of the total risk.

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 in all areas of California during the past few years. For example, in one large air district, cancer risk was 342 in one million based on 1992 data and in 2002, the average inhalation cancer risk decreased to 162 in one million (BAAQMD 2004, p. 12). Similar reductions occurred throughout the state's major metropolitan areas.

Existing Public Health Concerns

When evaluating a new Project, staff conducts a 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, which provides a basis on which to evaluate the significance of any additional health impacts from the proposed Project. Because of the very low population in the immediate vicinity of the project and because no existing health concerns within a 6-mile radius of the project have been identified by the applicant (GSEP 2009a, Section 5.15.1), staff did not conduct an analysis of existing public health issues.

Environmental Site Contamination

Site disturbances occur during demolition of existing structures, 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. The Phase I Environmental Site Assessment conducted for this site in 2009 found 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 (GSEP 2009a, Section 5.13.1.3).

To address the possibility that soil contamination would be encountered during construction of the GSEP, proposed Conditions of Certification **WASTE-1** and **WASTE-2** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. Staff believes that adherence to current ordinances and to staff’s proposed Conditions of Certification mentioned above will be adequate to address any soil or groundwater contamination that exists on this site. See the RSA/PA/DEIS section on **WASTE MANAGEMENT** for a more detailed analysis of this topic.

C.5.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

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 (discussed in the “Setting” section above), 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.

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 California Air Resources Board (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 cough, 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 (SRP) on Toxic Air Contaminants recommended a chronic REL (see REL discussion in Method of Analysis section above) for diesel exhaust particulate matter of 5 $\mu g/m^3$ and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6). [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.] The SRP did not recommend a value for an acute REL, since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved SRP's recommendations regarding health effect levels.

Construction of the GSEP, including site preparation, is anticipated to take place over a period of 37 months (GSEP 2009a, Section 3.7.1). As noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from eight to seventy years.

AFC Table B.5-5 (GSEP 2009a) and its updated version table K.5-5 (GSEP 2009f) present maximum daily and annual emissions from construction activities including fugitive dust and diesel exhaust. In response to Data Request # 137, the applicant conducted a health risk assessment for diesel particulate matter (DPM) from construction equipment emissions in accordance with methods provided by the South Coast AQMD in their guidance documents on modeling cancer risk from mobile sources. The applicant's modeling of worst-case construction emissions adjusted to a 37-month period (lifetime exposure adjustment factor of 0.0126) found that the cancer risk was estimates to be 0.1 in one million at the maximum impact receptor (MIR), below the level of significance (10 in one million). The chronic hazard index was found to be 0.005 at the MIR, below the level of significance of 1.0 (GSEP 2009f, Data Response Item 137).

Mitigation measures are proposed by both the applicant and Air Quality staff to reduce the maximum calculated PM10 as well as PM2.5 concentrations. These include the use of extensive fugitive dust control measures that are assumed to result in 90 percent reduction of fugitive dust emissions. In order to mitigate potential impacts from particulate emissions during the operation of diesel-powered construction equipment, staff notes that the use of ultra-low sulfur diesel fuel, an oxidation catalyst and soot

filters on diesel equipment is required. 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 percent. Such filters will reduce diesel emissions during construction and further reduce the impacts associated with diesel exhaust. (See the **Air Quality** section of this RSA for staff's proposal to control particulate matter.)

Operation Impacts and Mitigation

Emissions Sources

The emissions sources at the proposed GSEP site include two natural gas-fired auxiliary boilers, two cooling tower, two diesel-fueled emergency generators, two diesel-fueled emergency fire pumps, DPM from maintenance vehicles, and VOCs from HTF fugitive emissions. In response to Data Requests 139 and 142, the applicant revised the HRA for the entire facility to include maintenance vehicle DPM and HTF fugitive emissions.

As noted earlier, the first step in a health risk assessment is to identify potentially toxic compounds that may be emitted from the facility. Table 5.15-3 of the AFC lists toxic air contaminants that may be emitted by the project. Each TAC has a toxicity value published in the OEHHA Guidelines that includes the REL used to calculate short-term and long-term noncancer health effects, and the cancer unit risks used to calculate the lifetime risk of developing cancer (OEHHA 2003).

Public Health Table 2 lists toxic emissions potentially emitted from the GSEP and shows how each contributes to the health risk analysis. For example, the first row shows that oral exposure to acetaldehyde is not of concern, but if inhaled, may have cancer and chronic (long-term) noncancer health effects, but not acute (short-term) effects.

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				✔	✔
Arsenic	✔	✔	✔	✔	✔
Benzene			✔	✔	✔
Biphenyl					
1-3 Butadiene			✔	✔	
Cadmium		✔	✔	✔	
Copper				✔	✔
Diesel Exhaust			✔	✔	
Ethylbenzene				✔	
Formaldehyde			✔	✔	✔
Hexane				✔	
Naphthalene		✔	✔	✔	
Polycyclic Aromatic Hydrocarbons (PAHs)	✔	✔	✔	✔	
Propylene				✔	
Propylene oxide			✔	✔	✔
Selinium				✔	✔
Toluene				✔	✔
Xylene				✔	✔

*Source: OEHHA 2003 Appendix L and GSEP 2009a, Table 5.15-3.

Appendix B.1 of the AFC (GSEP 2009a) and Data Responses Set 1A Appendix K (GSEP 2009f) list non-criteria pollutants and their emission factors that may be emitted from the sources listed above. Emission factors were obtained from the U.S. EPA emission factors database (AP-42), the California Air Toxics Emission Factors (CATEF II) database, and the vendors for particular equipment. Table B.1-7 of the AFC (GSEP 2009a) and its updated version Table K.1-7 (GSEP 2009f) list emissions from maintenance vehicles including DPM.

Staff requested in Data Requests 141 and 142 that emissions of HTF toxic thermal degradation products be determined and considered in a HRA. According to the applicant's response, HTF may decompose into the following gases in the ullage system (GSEP 2009f, Data Response Item 141):

- 89.9 percent by weight Benzene
- 9.8 percent by weight Phenol
- 0.3 percent by weight Other VOCs

The applicant noted that the MSDS sheet for the HTF states that decomposition products of HTF (benzene and phenol) occur in trace amounts. In addition, the applicant proposes to use carbon adsorption technology for the HTF ullage system which is assumed to result in 99% control of VOCs. Therefore, 5 percent by weight of total VOCs were used to represent the upper limit for trace amounts of benzene and phenol. Table 3 of Data Response #141 provides the estimated emissions of benzene and phenol from HTF system components (GSEP 2009f).

Emissions Levels

Once potential emissions are identified, the next step is to quantify them by conducting a “worst case” analysis. Maximum hourly emissions are required to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are required to calculate cancer and chronic (long-term) noncancer health effects.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances that may result from the project. 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 ARB/OEHHA Hotspots Analysis and Reporting Program (HARP) modeling program. Finally, ambient concentrations were used in conjunction with RELs and cancer unit risk factors to estimate health effects which 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 revised screening health risk assessment for the project including all sources as presented in Data Response 139 resulted in a maximum acute hazard index of 0.00668 and a maximum chronic hazard index of 0.00119 at the Maximum Impact Receptor (MIR). The MIR represents the residential receptor where the highest concentrations of project-related pollutants would exist. The cancer risk was calculated to be 3.27 in 1,000,000 at the MIR.

As **Public Health Table 3** shows, both acute and chronic hazard indices are under the significance level of 1.0 and cancer risk is under the significant level of 10 in 1,000,000, indicating that no cancer or short- or long-term adverse health effects are expected.

Public Health Table 3 Operation Hazard/Risk at the Maximum Impact Receptor

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.007	1.0	No
Chronic Noncancer	0.001	1.0	No
Individual Cancer	3.3 in one million	10 in one million	No

Source: Data Response Item 139 (GSEP 2009f).

Staff conducted a quantitative evaluation of the risk assessment results presented in the Genesis Solar Energy Project AFC (09-AFC-8) and in the "Data Request Set 1A (#1-227)" (December 2009). Modeling files provided by the applicant were also reviewed.

Construction Phase Analysis

For the construction phase analysis, atmospheric dispersion modeling of diesel particulate matter (DPM) emissions from construction equipment and vehicles was conducted by the applicant using AERMOD. The maximum predicted offsite concentration of diesel particulate matter was reported by the applicant to be 0.02562 ug/m^3. Cancer risk due to diesel exhaust emissions was determined by multiplying the DPM concentration by the diesel cancer inhalation unit risk of 0.0003 (ug/m^3)$^{-1}$ and an adjustment factor of 0.0126 to account for the 37 month construction period. Cancer risk at the location of the maximum offsite concentration was determined to be 0.1 in a million and chronic HI to be 0.005 (noncancer chronic REL is 5 ug/m^3).

Operations Phase Analysis

For the operations phase analysis, atmospheric dispersion modeling of facility emissions was conducted by the applicant using AERMOD. Local meteorological data were used, on-site buildings were included for building downwash effects, and 6814 grid receptors were modeled.

A total of 23 emitting units were modeled by the applicant for facility operations including:

- 2 auxiliary boilers
- 2 diesel emergency generators
- 2 diesel firewater pumps
- 2 HTF (heat transfer fluid) vents
- 14 wet cooling tower cells (2 cooling towers, each with 7 cells)
- Fugitive emissions of toxic thermal degradation products of HTF and fugitive emissions of mobile sources involved in routine operations. These emissions were modeled as being emitted from a single area source located between the two solar fields.
- Total of 23 emitting sources evaluated at the proposed facility.

The HTF (heat transfer fluid) is circulated through the solar field where it is heated by sunlight concentrated on the receiver tube elements of the solar collectors. HTF is comprised biphenyl/diphenyl oxide. Thermal decomposition of HTF results in decomposition products that can include benzene, phenol and toluene. In modeling HTF fugitive loss emissions, the applicant assumed that 89.9 percent of the emissions would be comprised of benzene and 9.8 percent of phenol.

Staff used the HARP On-Ramp program to load the applicant's AERMOD results into the CARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.4a for the risk analysis. Exposure pathways assessed include inhalation, ingestion of home-grown produce, dermal absorption, soil ingestion and mother's milk. Emission factors obtained from the applicant's modeling files and used in this analysis are listed in **Public Health Table 5**. 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.

Cancer risk and chronic and acute hazard index values obtained by staff are compared to results reported by the applicant in the December 2009 response to data requests in **Public Health Table 6**. Risk and hazard were determined at the point of maximum impact, PMI, under the 70 year residential scenario, located between the two solar fields. The nearest residential receptor is located 15 miles from the site and there are no sensitive receptors within six miles of the project site.

Public Health Table 7 presents substance- and source-specific cancer risks at the PMI. Analysis of this table indicates that 100% of the cancer risk at the PMI is attributed to emissions from two sources: 12% due to emissions from the HTF vents and 88% due to fugitive emissions. Additional analysis indicates that 100% of cancer risk at the PMI is attributed to emissions of two substances: 47% due to benzene emissions (from the auxiliary boiler, the HTF vents and fugitive emissions) and 52% due to diesel particulate matter emissions (from onsite mobile sources as well as the two diesel engines).

Cumulative impacts were not evaluated as there are no facilities within an eight mile radius of the project site (source: page 5.15-10 of the AFC).

Public Health Table 5 Operation Phase Emission Rates

Substance	Annual Average Emissions (lbs/year)	Maximum 1-Hour Emissions (lbs/hour)
EMISSION RATES FROM EACH OF 2 AUXILIARY BOILERS		
Acetaldehyde	1.99E-03	1.36E-04
Acrolein	1.95E-03	1.33E-04
Benzene	1.05E-03	7.15E-05
Ethylbenzene	9.73E-04	6.62E-05
Formaldehyde	2.05E-03	1.40E-04
Hexane	2.72E-03	1.85E-04
Naphthalene	1.03E-04	6.97E-06
PAHs (4)	3.50E-05	2.38E-06
Propylene	2.00E-01	1.36E-02
Toluene	1.40E-02	9.50E-04
Xylene	8.09E-03	5.50E-04
EMISSION RATES FROM EACH OF 14 COOLING TOWER CELLS		
Arsenic	2.98E-03	9.32E-07
Barium	1.07E-02	3.34E-06
Manganese	9.40E-03	2.94E-06
EMISSION RATES FROM OPERATION OF EACH OF 2 EMERGENCY GENERATORS		
Diesel PM	2.76E+00	5.00E-02
EMISSION RATES FROM OPERATION OF EACH OF 2 EMERGENCY FIRE PUMPS		
Diesel PM	1.98E+00	4.00E-02
EMISSION RATES FROM EACH OF 2 HTF VENTS		
Benzene	4.85E+02	1.53E-01
Phenol	5.30E+01	1.65E-02
EMISSION RATES FROM FUGITIVE EMISSIONS		
Benzene	6.90E+02	1.67E-01
Phenol	6.90E+02	1.67E-01
Diesel PM	4.60E+01	5.25E-03

Public Health Table 6 Cancer Risk and Hazard Due to Operation Phase Emissions

	Staff's Analysis			Applicant's Analysis		
	Cancer Risk (per million)	Acute HI	Chronic HI	Cancer Risk (per million)	Acute HI	Chronic HI
PMI (Rec. #1)	3.27	0.0085*	0.0013	3.27	0.0067	0.0012

PMI (point of maximum impact) is located between the two solar fields.
** At Rec. #266*

Public Health Table 7 Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances from All Sources at the Point of Maximum Impact (PMI)

Substance	Auxiliary Boilers (2 units)	Cooling Towers (14 cells)	Diesel Generators (2 units)	Diesel Firewater Pumps (2 units)
Acetaldehyde	1.48E-14			
Arsenic		1.21E-09		
Benzene	7.80E-14			
DieselExhPM*			1.99E-09	6.56E-09
DieselExhPM*			1.99E-09	6.56E-09
Ethyl Benzene	6.29E-15			
Formaldehyde	3.19E-14			
Naphthalene	9.18E-15			
PAHs-w/o	1.46E-11			
TOTAL	1.48E-11	1.21E-09	3.97E-09	1.31E-08

Substance	HTF Vents (2 units)	Fugitive Emissions (1 area source)	Total Cancer Risk
Acetaldehyde			1.48E-14
Arsenic			1.21E-09
Benzene	3.88E-07	1.16E-06	1.55E-06
DieselExhPM		8.52E-07	8.60E-07
Ethyl Benzene			6.29E-15
Formaldehyde			3.20E-14
Naphthalene			9.18E-15
PAHs-w/o			1.46E-11
TOTAL	3.88E-07	2.87E-06	3.27E-06

Cooling Towers

In addition to being a source of potential toxic air contaminants, the possibility exists for bacterial growth to occur in the two wet cooling towers, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' Disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling towers and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

The State of California regulates recycled water for use in cooling towers in Title 22, Section 60303, California Code of Regulations. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation does not apply to the GSEP project since it intends to use groundwater supplied from on-site wells; however, the potential remains for Legionella growth in cooling water at the GSEP due to nutrients found in groundwater.

The U.S. EPA published an extensive review of Legionella in a human health criteria document (EPA 1999). The U.S. EPA noted that Legionella may propagate in biofilms (collections of microorganisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling towers can aid in the transmission of Legionella from water to air. The U.S. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk - however small - of disease in humans.

In February of 2000 the Cooling Technology Institute (CTI) issued its own report and guidelines for the best practices for control of Legionella (CTI 2000). The CTI found that 40-60 percent of industrial cooling towers tested was found to contain Legionella. More recently, staff has received a 2005 report of testing in cooling towers in Australia that found the rate of Legionella presence in cooling tower waters to be extremely low, approximately three to six percent. The cooling towers all had implemented aggressive water treatment and biocide application programs similar to that required by proposed condition of certification **Public Health-1**.

To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling

system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling towers, and the overall general control of microbiological populations.

Good preventive maintenance is very important in the efficient operation of cooling towers and other evaporative equipment (ASHRAE 1998). Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. Staff notes that most water treatment programs are designed to minimize scale, corrosion, and biofouling and not to control Legionella.

The efficacy of any biocide in ensuring that bacterial and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures and effective monitoring.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, staff has proposed Condition of Certification **Public Health-1**. The condition would require the project owner to prepare and implement a biocide and anti-biofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times and that periodic cleaning is conducted to remove bio-film buildup. Staff believes that with the use of an aggressive antibacterial program coupled with routine biofilm removal, the chances of Legionella growing and dispersing would be reduced to insignificance. The applicant has stated that an appropriate biocide program and anti-biofilm agent monitoring program would be implemented for the cooling towers (GSEP 2009a, Section 5.15.2.9). (note: The requirements for the use, storage, and spill response for all chemicals, including biocides, are described in the **HAZARDOUS MATERIALS MANAGEMENT** section of this RSA/PA/DEIS.)

Closure and Decommissioning Impacts and Mitigation

Closure of the proposed GSEP (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 30 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 CEC for approval before implementation (GSEP 2009a, Section 3.9). 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 GSEP. 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 GSEP would be insignificant.

C.5.4.3 CEQA LEVEL OF SIGNIFICANCE

Staff's analysis of public health impacts from the proposed GSEP has determined that impacts would be below the CEQA level of significance.

C.5.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.5.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.5.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Emissions associated with the construction and operation of the Reduced Acreage Alternative would be reduced by approximately 50% from those estimated for the GSEP as proposed. The reduced emissions would decrease the cancer risk and chronic and acute hazard indices predicted for the 250 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, indicating that no significant public health impacts are expected. Therefore staff concludes that with respect to public health impacts, the Reduced Acreage Alternative is not preferable over the project as proposed

C.5.5.3 CEQA LEVEL OF SIGNIFICANCE

The CEQA level of significance for public health would not change with the Reduced Acreage Alternative, as both the project as proposed and the Reduced Acreage Alternative would have impacts below the level of significance. The same conditions of certification would be required for the Reduced Acreage Alternative and the project as proposed.

C.5.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be

used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

C.5.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.5.6.2 Assessment of Impacts and Discussion of Mitigation

The **Public Health** section of this RSA/PA/DEIS discusses toxic emissions to which the public could be exposed during project construction and routine operation. The majority of the toxic emissions from the proposed project would not change with the inclusion of dry cooling and would not cause additional impacts. Dry cooking would however eliminate the risk of contracting legionellosis by inhaling aerosolized Legionella-contaminated water from wet cooling towers.

As noted in the **Air Quality** section, the additional construction activities from erecting a dry cooling structure would increase the dust-related PM10 emissions. PM10 impacts are of concern in this public health analysis because health effects can result from the interaction of the toxic pollutants that might be adsorbed to the PM10. Such adsorption would be associated with specific soil contamination that must be remediated before beginning construction. The toxic health risks from diesel equipment emissions would be minimized through implementation of the Conditions of Certification in the **Air Quality** section, which would also apply to construction of any cooling structures that might be used for the project.

C.5.6.3 CEQA Level of Significance

No new impacts to health and safety resources would be created with use of ACCs in place of cooling towers, and the potential impacts of Legionella growth in the cooling towers would be eliminated. The overall impacts of the project with dry cooling would be similar to those of the proposed project as both would have impacts below the level of significance with incorporated mitigation measures.

C.5.7 NO PROJECT/NO ACTION ALTERNATIVE

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

C.5.7.1 NO ACTION ON PROPOSED PROJECT APPLICATION AND ON CDCA LAND USE PLAN AMENDMENT

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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. As a result, none of the construction or operation air emissions from the proposed project would occur and none of the benefits of the proposed project in displacing fossil fuel fired generation and reducing associated pollutant emissions 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.

C.5.7.2 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAN USE PLAN TO MAKE THE AREA AVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the Energy Commisson 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 a result, air emissions would result from the construction and operation of the solar technology and would likely be similar to the air quality impacts from the proposed project. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all the technologies would require some grading and maintenance. The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated pollutant emissions could occur with a different solar technology at this site and therefore with this alternative. As such, this No Project/No Action Alternative could result in air quality impacts and benefits similar to the impacts under the proposed project.

C.5.7.3 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAND USE PLAN TO MAKE THE AREA UNAVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed Genesis Solar Energy 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, the air quality of the site is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in air quality impacts under the proposed project nor would it result in the air quality benefits from 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.5.8 CUMULATIVE IMPACTS

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 Figure 1** 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 2, I-10 Corridor 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 I-10 Corridor 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 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 RSA/PA/DEIS.

C.5.8.1 GEOGRAPHIC SCOPE OF ANALYSIS

For the purpose of the public health cumulative analysis, emissions from construction or operation of the GSEP could potentially combine with emissions from past, present and reasonably foreseeable projects to result in adverse health effects to the public. Cumulative impacts in the area of public health could occur if emission sources are close enough so that their plumes combine. Due to differences in emission source elevations, terrain features, wind direction, and other meteorological factors, it is unlikely that emission plumes from two or more facilities would combine unless they are located in very close proximity. Furthermore, dispersion of plumes tends to occur in parallel, preventing the mixing of plumes from separate locations. On the basis of numerous previous air dispersion modeling conducted by staff to assess public health cumulative impacts, staff finds that the geographic area considered for cumulative impacts on Public Health is only within the project boundaries or within 1/4 mile of project emission sources.

C.5.8.2 EFFECTS OF PAST AND PRESENT PROJECTS

For this analysis, staff analyzed the potential of existing projects in the vicinity of the GSEP to contribute to cumulative impacts. The only existing facility located within nine miles of the project site is the Ironwood State Prison, which has a “no” risk prioritization score according to CARB. This means that emissions from this facility are either below the levels for which a health risk assessment is required or else the calculated risk from this facility is insignificant (GSEP 2009a, Section 5.15.3). The nearest existing source of emissions is Interstate 10, a major route for trucks delivering goods to and from California, located about 5 air miles south of the GSEP. As mentioned above, none of these emission sources are close enough to cause cumulative impacts with the proposed GSEP. Staff’s previous modeling has shown repeatedly that unless two sources are within approximately half a mile, their cumulative health risks do not combine to turn an insignificant individual health risk into a significant one.

C.5.8.3 EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

There is a substantial amount of development planned in the I-10 corridor including over 10 solar power plants and one natural gas-fired power plant as well as commercial and residential projects. Public health impacts at the proposed project are also not expected to be affected by any reasonably foreseeable future projects, including the proposed Palen and Blythe solar projects proposed for the I-10 corridor. The reasons for staff’s position are described above.

Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction. The construction of the GSEP is not expected to result in short term adverse impacts related to public health. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the GSEP, however, short term impacts related to public health during construction of those cumulative projects are not expected to occur.

Operation. The operation of the GSEP is not expected to result in long term adverse impacts related to public health during operation of the project even though it is

expected that some of the cumulative projects described above may be operational at the same time as the GSEP.

Decommissioning. The decommissioning of the GSEP is not expected to result in adverse impacts related to public health. 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, it is not expected that significant impacts related to public health during decommissioning of the GSEP generated by the cumulative projects will occur.

C.5.9.4 OVERALL CONCLUSION

Public health impacts of the GSEP 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.5.10 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**.

Staff concludes that construction and operation of the GSEP will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **PUBLIC HEALTH**.

C.5.11 NOTEWORTHY PUBLIC BENEFITS

It is noteworthy that a solar electric generating facility such as the proposed GSEP 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 GSEP 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.5.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

Public Health-1 The Project owner shall develop and implement a Cooling Water Management Plan to ensure that the potential for bacterial growth in cooling water is kept to a minimum. The Plan shall be consistent with the Cooling Technology Institute's "Best Practices for Control of Legionella" guidelines.

Verification: At least 60 days prior to the commencement of cooling tower operations, the Cooling Water Management Plan shall be provided to the CPM for review and approval.

C.5.13 RESPONSE TO AGENCY AND PUBLIC COMMENTS

No comments have been received on the topic of public health.

C.5.14 CONCLUSIONS

Staff has analyzed potential public health risks associated with construction and operation of the GSEP and does not expect any significant adverse cancer, short-term, or long-term health effects to any members of the public including low income and minority populations, from project toxic emissions. Staff also concludes that its analysis of potential health impacts from the proposed GSEP 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 GSEP project would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area. With the incorporation of staff's proposed mitigation (Condition of Certification **Public Health-1**), the proposed facility will not present a significant health risk to the public.

C.5.15 REFERENCES

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C.6 - LAND USE, RECREATION, AND WILDERNESS

Testimony of Negar Vahidi

C.6.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff (hereafter referred to as “staff”) have reviewed the proposed Genesis Solar Energy Project in accordance with the requirements of the California Environmental Quality Act (CEQA). This section addresses land use issues related to agriculture and rangeland resources, wilderness and recreation resources and compatibility with existing land uses and applicable laws, ordinances, regulations, and standards (LORS). Implementation of the proposed Genesis Solar Energy Project (GSEP or “proposed project”) would not result in any adverse impacts to the aforementioned resources.

The applicant has submitted an application to the Bureau of Land Management (BLM) requesting a right-of-way (ROW) grant 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 Land Use Plan Amendment process. Because the proposed project is not currently identified in the CDCA Plan, the proposed project would require a BLM ROW grant and an approved project-specific CDCA Plan Amendment.

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.6.4.3 (CEQA Level of Significance). In summary, impacts on agricultural lands and rangeland management 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. As discussed in **LAND USE Table 3,** the project would comply with all applicable LORS.

The Reduced Acreage Alternative to the proposed project would essentially be Unit 1 of the proposed project, and would occupy approximately 990 acres of land. The conversion of 990 acres of land to support the components and activities associated with this alternative would disrupt current recreational activities in established federal recreation areas, but would not result in adverse effects on recreational users of these lands. This effect would be proportionally less than the 1,890 acres affected by the proposed project.

The Dry Cooling Alternative would disturb approximately the same amount of land as the proposed project, 1,890 acres of land. The bulk and noise of the ACCs used in this alternative would be marginally more disruptive to current recreational activities in established federal recreation areas, but would not result in adverse effects on recreational users of these lands.

Approximately one million acres of land are proposed for solar and wind energy development in southern California desert lands. Cumulative impacts to approximately

one million acres of land would all combine to result in adverse effects on agricultural lands and recreational resources. The proposed GSEP (and its alternatives) would not contribute to cumulative impacts to agricultural resources or rangelands. The potential of the GSEP (and its alternatives) to disrupt recreational activities would be limited and less than cumulatively considerable when considered in the context of past, present and reasonably foreseeable future projects. However, the GSEP (and its alternatives) would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Chuckwalla Valley and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact.

C.6.2 INTRODUCTION

The land use analysis focuses on the project's consistency with existing land use 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.6.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with CEQA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission. CEQA requires that the significance of individual effects be determined by the lead state Agency.

While this document is intended to meet the requirements CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both CEQA and NEPA Implementing Regulations (40 CFR Parts 1500-1508).

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, the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA (CEQ NEPA Regulations) 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. CEQ NEPA Regulations require that an Environmental Impact Statement (EIS) be prepared when a proposed major federal action (project) as a whole has the potential to "significantly affect the quality of the human environment." By preparing this

EIS, the BLM (as the NEPA lead Federal agency) has deemed that the project would generally have a significant impact on the 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 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 CEQ NEPA Regulations 40 CFR Part 1508.27.

Effects of the proposed project on the land use 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 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 Areas (HAs) and 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.

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.6.4 PROPOSED PROJECT

C.6.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed Genesis Solar Energy Project (GSEP) site is approximately 1,890 acres and is located in the eastern region of Riverside County. The Applicant has requested a 4,640-acre ROW on public land administered by the Bureau of Land Management (BLM), but only 1,890 acres would be used for the GSEP. The northern boundary of the proposed project site is adjacent to the Palen-McCoy Wilderness, and the southern boundary is approximately two miles north of Interstate Highway 10 (I-10). The Palen Dry Lake Area of Critical Environmental Concern (ACEC), administered by the BLM, is approximately 5.5 miles west of the GSEP site, and the BLM's Chuckwalla Valley Dune Thicket ACEC is adjacent to the southwest of the proposed transmission interconnection.

The GSEP site currently consists of largely undisturbed desert land. A single four-wheel drive road runs north-south through the western portion of the greater 4,640-acre ROW area, but would be approximately 4.5 miles west of the GSEP facility. Access to the GSEP facility would be provided via a new access road constructed to the site from the Wiley Well Rest Area off of I-10 (GSEP 2009a).

Construction and operation of the GSEP would include the following features and facilities:

- two independent 125-MW solar electric generating facilities utilizing parabolic trough technology and associated equipment and infrastructure;
- one 0.46-acre laydown area near Wiley Well rest area for transmission line construction
- a minimum of two groundwater wells and a set of storage tanks for each 125-MW unit that would include a 500,000 gallon raw water/fire water tank, a 1,250,000 gallon treated water tank, and a 250,000 gallon wastewater tank;
- each 125-MW unit would have three 8-acre double-lined evaporation ponds, totaling 48 acres of ponds for the two units;
- a common administration building and warehouse would be located between the two units and each unit would have a control building located in each power block, totaling approximately 0.89 acres;
- an approximately 2.5-acre, 230-kV switchyard near the power block of unit two;
- approximately 6.5 miles of 230-kV gen-tie transmission line routed in a southeasterly ROW connecting to the Blythe Energy Project Transmission Line (BEPTL) and ultimately terminating at the proposed Southern California Edison (SCE) Colorado River Substation;

- approximately 6.5-miles of natural gas pipeline roughly paralleling the proposed transmission line to connect with existing Southern California Gas (SCG) infrastructure one mile west of the Wiley Well Rest Area; and
- approximately 6.5-miles of paved access road, also following the proposed transmission line ROW, but extending out to Wiley Well Rest Area.

All of the facilities described above, with the exception of the transmission line, access road, and natural gas pipeline would be enclosed in an eight-foot high chain-link security fence to restrict public access to the site.

Surrounding Area

The proposed project site is located in eastern Riverside County, approximately 25 miles west of the City of Blythe and approximately 35 miles west of the California-Arizona border. The City of Desert Center is located approximately 27 miles west of the proposed GSEP site. The Ironwood and Chuckwalla State Prisons are located adjacent to each other approximately nine miles south of the GSEP site. The surrounding area consists of undeveloped desert land surrounded by the McCoy Mountains to the east, the Palen Mountains (including the Palen/McCoy Wilderness Area) to the north, Ford Dry Lakebed to the south, and I-10 approximately two miles south of the southern border of the project site.

Agricultural Lands and Rangeland Management

According to the California Department of Conservation (DOC) Farmland Mapping and Monitoring Program (FMMP) maps, the majority of the county's existing agricultural land is located in three portions of the county, the San Jacinto and Coachella Valleys in the western half of the county and the Palo Verde Valley in the eastern portion of the county, along the Colorado River. The county's major urban areas such as Riverside, Moreno Valley, Corona, Palm Springs, Palm Desert, and Indio are surrounded by these agricultural lands. The proposed project site is located between the cities of the Desert Center and Blythe. According to the BLM, the proposed project site and associated linear facilities are located wholly within BLM-administered land.

The United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) provides information on designation of soils in areas with agricultural lands (NRCS 2009a). According to the NRCS's Web Soil Survey (WSS), the entire project site is outside the NRCS survey area (NRCS 2009b).

In addition, the Farmland Mapping and Monitoring Program (FMMP) of the California Department of Conservation (DOC) provides statistics on conversion of farmland to non-agricultural uses throughout the State. According to the farmland map of Riverside County, the proposed project site is entirely within BLM-administered lands, and has not been surveyed or included in a farmland mapping category (DOC 2008) of the DOC. No surveyed agricultural lands are adjacent to the proposed GSEP site.

The BLM manages rangelands throughout the west for the use of wildlife and livestock. The rangelands are divided into allotments and pastures for management purposes (BLM 2009b). Livestock grazing allotments on BLM-administered land may be

authorized under a permit or lease. The proposed GSEP site was previously a part of the Ford Dry Lake Pasture livestock grazing allotment, although this allotment was canceled after the Northern and Eastern Colorado Desert Coordinated Management Plan Amendment (NECO) was approved (BLM 2009c, GSEP 2009a).

Wilderness and Recreation

Wilderness land in Riverside 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).

The wilderness areas closest to the proposed project site are the Palen Dry Lake ACEC, which is approximately 5.5 miles west of proposed project site, the Chuckwalla Valley Dune Thicket ACEC located adjacent to the southwest of the linear ROW, and the Mule Mountain ACEC approximately 12 miles southeast of the GSEP. The 3,632-acre Palen Dry Lake and 4,092-acre Mule Mountain ACECs are closed to recreation and are designated for their archaeological values. The 2,273-acre Chuckwalla Valley Dune Thicket ACEC is also closed to recreation and is designated due to its wildlife habitat (BLM 1999).

The Palen/McCoy Wilderness located adjacent to the northern boundary of the ROW and project site. Spanning 236,488 acres, the Palen/McCoy Wilderness is notable for its opportunities for solitude and unconfined recreational activities including camping, hunting and fishing (BLM 2009d).

The vast majority of Riverside County land is designated as “Open Space/Conservation” according to the county Land Use Map, and the open space and recreation use areas under BLM management are designated as “open” or “limited use” for OHV designations. (RCTLMA 2008; BLM 1999). In “open” areas, all forms of cross-country travel are permitted within the posted boundaries, and in “limited use” areas vehicle travel is limited to approved/signed routes of travel and no cross-country vehicle travel is allowed. The NECO is an amendment to the BLM’s California Desert Conservation Area (CDCA) Plan. Under both the CDCA and the NECO, the proposed project site is categorized as Class M (Moderate Use). Recreational opportunities in Class M (Moderate Use) range from backpacking and primitive, unimproved site camping to hiking to vehicle touring and competitive motorized-vehicle events on approved routes of travel. Prior to adoption of the NECO, Ford Dry Lake was an OHV area without amenities, but allowed cross-country travel. With adoption of the NECO, OHV use within Ford Dry Lake was restricted to approved open routes. There are three (3) approved open routes designated by NECO within the greater 4,640-acre BLM ROW requested by the applicant, but the proposed project site would not be traversed by any open routes. The linear ROW would cross one (1) approved open route that could be disturbed by operation or construction activities related to the proposed project. **Land**

Use Table 1 describes recreation areas beginning with the area closest to the proposed project site.

LAND USE Table 1
Open Space and Recreation Areas

Recreation Area	Jurisdiction/ Administration	Approximate Distance from the Proposed Project Site	Approximate Acreage	Allowed Uses
Palen/McCoy Wilderness	Open Area- BLM	Adjacent to northern boundary	236,488	Camping, hiking, hunting, fishing
Chuckwalla Valley Dune Thicket ACEC	Limited Area-BLM; ACEC	Adjacent to linear facilities ROW	2,273	Closed to recreation
Palen Dry Lake ACEC	Limited Area-BLM; ACEC	5.5 miles west	3,632	Closed to recreation
Mule Mountains ACEC	Limited Area-BLM; ACEC	12 miles southeast	4,092	Closed to recreation
Wiley Well Campground	Open Area-BLM	7 miles south	NA	Camping
Coon Hollow Campground	Open Area-BLM	10 miles south	NA	Camping
Bradshaw Trail	Limited Area-BLM	10 miles south	NA	OHV, Camping

Source: BLM 2009d; BLM 2002.

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), which are geographic areas where wild horse and/or burro populations were found at the passage of the Act in 1971 (BLM 2009e) and Herd Management Areas (HMAs), which are designated by BLM through the land use planning process. California contains 33 HAs and 22 HMAs. According to BLM maps, the Chocolate-Mule Mountains HA/HMA is located approximately two miles southeast of the proposed project site in Riverside County near the California-Arizona border (BLM 2009f, BLM 2009g). As such, the proposed project would not contain or traverse any established HMAs or HAs.

Land Use and LORS Compliance

The proposed project site (1,890 acres) is located within the “Moderate Use” category of the BLM’s CDCA Plan. **LAND USE Table 2** provides a general description of the land use LORS applicable to the proposed project and surrounding lands. The project’s consistency with these LORS is discussed in **LAND USE Table 3**. Because the proposed project site would be located solely on BLM-administered land and the only portion of the linear ROW that would be outside of BLM boundaries would be limited to

stringing conductor on existing transmission poles, no state or local LORS are applicable to the proposed project.

LAND USE Table 2
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. FLPMA mandates that public lands be managed on the basis of multiple use and sustained yield unless otherwise specified by law. 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).
Farmland Protection Policy Act, Subtitle I of Title XV, Section 1539-1549 of the Agriculture and Food Act of 1981(NRCS 2009)	The FPPA is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that—to the extent possible—federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. Federal agencies are required to develop and review their policies and procedures to implement the FPPA every two years. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.
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 more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.
Northern and Eastern Colorado Desert Coordinated Management Plan (BLM 2002)	The BLM's Northern and Eastern Colorado Desert Coordinated Management Plan establishes goals and planned actions that are designed to meet the goals of the CDCA Plan. They emphasize the protection of wildlife and cultural resource values while permitting a compatible level of motorized vehicle use.

Applicable LORS	Description
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.
The Wild Free-Roaming Horses and Burros Act of 1971 (BLM 2009h)	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.
State	
None	
Local	
None	

C.6.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction and Operation

Agricultural Lands and Rangeland Management

According to the AFC, "no lands designated as containing Prime farmland or Farmland of Statewide Importance are present within the Project site…The nearest farmland of Statewide Importance, which is also Prime Farmland, is approximately 15 miles to the east of the Project, in Blythe. The Project area lies outside of the FMMP survey area" (GSEP 2009a). Staff conducted analysis of agricultural land and rangeland to verify the Applicant's assessment.

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:

- **California DOC:** As the project site and linear ROW are located entirely within lands under BLM jurisdiction, this land is unsurveyed by the FMMP (DOC 2008).

- **USDA NRCS:** As with the California DOC, as the project site and linear ROW are located entirely within BLM lands, soil surveys for these sites have not been completed (NRCS 2009b).
- **Riverside County:** As the project site and linear ROW are entirely within BLM lands, these lands are not subject to Riverside County land use regulations (GSEP 2009a).
- **Williamson Act**: The project site is not located in an area that is under a Williamson Act contract (GSEP 2009a).

The DOC's FMMP mapping information is used in Staff Assessments to analyze impacts to important farmlands (i.e., Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) in the state. The FMMP designation for the proposed project site and linear ROW are unsurveyed and are not included in any other mapping category, such as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance (DOC 2008). Therefore, no farmland conversion impacts are expected as a result of proposed project or linear facilities' construction, and the project would not involve other changes in the existing environment which could result in conversion of farmland, to non-agricultural uses.

In regards to rangeland management, as noted in the "Setting and Exiting Conditions," the project site and linear ROW are located on the canceled Ford Dry Lake Pasture livestock grazing allotment. As the Ford Dry Lake Pasture allotment has been canceled, no livestock grazing would be adversely affected by construction or operation of the proposed project.

Wilderness and Recreation

Approval of the proposed project would directly remove approximately 1,800 acres from potential use for recreational opportunities such as backpacking, camping, rockclimbing, hunting, or other activities. As noted in the "Setting and Existing Conditions" section, no recreational routes designated by the NECO are within the project site and construction laydown site. One "open" route would be crossed by the proposed linear ROW. While the proposed project would remove recreation opportunities at the site, due to the remote nature of the site along with the BLM's existing restrictions on recreational activities in the area, direct impacts to recreation use of the proposed project site would be limited. While construction of the proposed transmission line would traverse an "open" route and result in disruptions to motorized vehicle use along this route, as the transmission line would be strung over the route on existing structures, it would not permanently disrupt use of the route. Any impacts on the route by the linear ROW would be temporary and short-term.

The project would not be constructed on wilderness lands so it would not directly disrupt activities in a federal wilderness area. However, the Palen/McCoy Wilderness north of the project site attracts visitors based on its scenic, biological, cultural, and recreational amenities. The proposed project would not substantially reduce the scenic value of this wilderness area (see the **Visual Resources** section of this document).

The 3,632-acre Palen Dry Lake ACEC occurs southwest of the project site and is managed for protection of its prehistoric resources as a Multiple Use Class M (moderate) unit; the proposed project would not substantially reduce the cultural values of this wilderness area (see the **Cultural Resources** section of this document).

The 2,273-acre Chuckwalla Valley Dune Thicket ACEC occurs approximately two miles southeast of the project site and is managed for Moderate Use Class M unit for its wildlife habitat use, specifically desert tortoise. The proposed project would not substantially reduce the cultural values of this wilderness area (see the **Biological Resources** section of this document).

Thus, from a land use perspective, the proposed project would not adversely affect wilderness areas in the area.

Horses and Burros

The proposed project would not contain or traverse any established BLM HAs or HMAs. The nearest, the Chocolate-Mule Mountains HA/HMA, is located approximately two miles southeast of the proposed ROW in Riverside County near the California-Arizona border (BLM 2002). In addition, following construction, fencing around the site would keep any burros outside of the proposed project location. Therefore, the proposed project would not result in any interference with BLM's management of an HA or HMA. 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 3** (below).

Land Use Compatibility and LORS Compliance

Physical Division of an Existing Community

The proposed project would not physically divide an established community[1], because the proposed project and associated linear facilities would be located on undeveloped lands (and within existing utility ROWs) administered by the BLM. In addition, the proposed project would not be located within or near an established community. Neither the size nor the nature of the project would result in a physical division or disruption of an established community. In addition, no existing roadways or pathways within an established community would be blocked. Due to the temporary nature of construction activities, construction-generated nuisances such as dust and noise are not expected to adversely affect recreational uses in the area. Due to the intermittent nature of similar operation-related impacts, staff concludes that any potential impacts would not adversely affect recreational uses. For a detailed analysis of construction and operation-related nuisance impacts, please see the **Air Quality** and **Noise** sections.

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

[1] An established community usually refers to a residential community.

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 a Land Use 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 administers. The CDCA Plan, while recognizing the potential compatibility of solar generation facilities on BLM-administered land, requires that all sites associated with power generation or transmission not identified in the Plan be considered through a land use plan amendment process (FR 2008). 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 Federal laws, regulations, and policies relevant to BLM-administered land;
- The plan amendment process would include an EIS (i.e., this joint Energy Commission Staff Assessment/BLM EIS) to comply with CEQ NEPA Regulations;
- Where existing planning decisions are still valid, those decisions would 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);
- Consultation with the State Office of Historic Preservation (SHPO) would be conducted throughout the plan amendment process (please see the **Cultural Resources** section); 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 potential land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on BLM-administered land would be authorized in accordance with Title V of the FLMPA of 1976 and the Federal Regulations at 43 CFR part 2800. This Environmental Impact Statement (EIS) acts as the mechanism for

meeting CEQ NEPA Regulation requirements, and also provides the analysis required to support a land use plan amendment identifying the facility within the Plan.

The proposed project area is within the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) area. The NECO is an update amendment to the CDCA Plan to make it compatible with Desert tortoise conservation and recovery. The NECO is a landscape-scale planning effort for most of the California portion of the Sonoran Desert ecosystem that promotes desert tortoise conservation and recovery.

In 1990 the Desert tortoise was listed as a threatened species under the federal Endangered Species Act. By law, land managing agencies are required to review their current land use plans, adjust them as necessary, and consult on their adequacy with the U.S. Fish and Wildlife Service.

Energy Commission staff have concluded that without mitigation the project would be a substantial contributor to the cumulatively significant loss of biological resources within the Chuckwalla Valley and the NECO area. Staff has recommended compensatory mitigation to offset direct, indirect, and cumulative impacts to desert tortoise and other special-status species, and to assure compliance with state and federal laws such as the federal and state endangered species acts and regulations protecting waters of the state; see the **BIOLOGICAL RESOURCES** section of this Revised Staff Assessment.

A Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) will be required for the project by biological staff as a Condition of Certification by the California Energy Commission; see the **BIOLOGICAL RESOURCES** section. The BRMIMP comprehensively describes avoidance, minimization, and mitigation measures.

With the effective implementation of specific species and habitat mitigation, active management and restoration practices on the WHMA portion of the project area, there would not be a project conflict with this CEQA criterion under this land use plan.

As the proposed project would be located solely on BLM-administered land, there are no state, regional, county, or other local land use LORS applicable to the proposed project. Staff's analysis of the proposed project's consistency with applicable federal land use LORS is presented in **LAND USE Table 3.** Based on staff's independent review of applicable LORS documents, the proposed project would be consistent with applicable land use LORS.

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LAND USE Table 3
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.6.4.2 (under the subsection entitled "Agricultural Lands and Rangeland Management"), no farmland would be converted under the proposed project and impacts to rangelands would not be adverse. In addition, construction of the proposed project and its associated linear facilities would be temporary, and the project would not involve other changes in the existing environment which 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 (Including the Northern and Eastern Colorado Desert Coordinated Management Plan Amendment) (BLM 1980)	**Chapter 2 – Multiple-Use Classes** **MULTIPLE-USE CLASS GUIDELINES** MULTIPLE-USE CLASS M Moderate Use Multiple-Use Class M 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 to mitigate damage to those resources which permitted uses may cause. All types of electrical generation plants may be allowed in accordance with state, federal, and local laws. New gas, electric, and water transmission facilities and cables for interstate communication may be allowed only within designated corridors. Existing facilities within designated corridors may be maintained and upgraded or improved in accordance with	YES (with an approved BLM project-specific CDCA Plan Amendment)	Approximately 1,890 acres of the proposed project site is administered by the BLM and is managed under multiple use Class M (Multiple Use) categories in conformance with the CDCA Plan (GSEP 2009a). The proposed project consists of an electrical generating facility, a transmission line, a natural gas pipeline, an access road 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 Genesis Solar Energy Project. Upon BLM's amendment of the CDCA plan for the Genesis Solar Energy Project, the proposed project would be fully compliant with the CDCA Plan. This Environmental Impact Statement (EIS) acts as the mechanism for meeting CEQ NEPA Regulation requirements, and also provides the analysis required to support a Land Use Plan Amendment identifying the facility within the Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	existing rights of way grants or by amendments to right of way grants. Existing facilities outside designated corridors may only be maintained but not upgraded or improved.		
	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. Therefore, the proposed project would not result in any interference with BLM's management of an HA or HMA, and would be consistent with this element of the CDCA Plan.
	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	YES	The proposed project's linear facilities would use existing and established utility ROWs to the greatest extent possible, connecting to existing access roads at Wiley Well and stringing transmission along the BEPTL poles. 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
	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.		
	Addendum B: Interim Management Guidelines **Chapter III. Guidelines for Specific Activities** **Lands Actions – Disposal, Rights-of-Way, Access and Withdrawals**	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, the project would be in compliance with this guideline of the CDCA Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	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.		
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	Establishes and reaffirms the	YES	In regards to rangeland management, as noted in the “Setting and Exiting

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Improvement Act	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.		Conditions," the proposed project would be located on the canceled Ford Dry Lake Pasture livestock grazing allotment. As this livestock grazing allotment has been canceled, the proposed project would not convert any rangeland used for livestock grazing and so would be in compliance with this Act.
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.6.4.2, the proposed project would not contain or traverse an established HA or HMA. As such, the proposed project would be consistent with this Act.

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 30 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 CEC and BLM a contingency plan or a closure and 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 closure and 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 decommissioning, 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.

In addition, staff's proposed Condition of Certification **BIO-23** requires the applicant to develop a Decommissioning and Closure Plan and cost estimate that meets the requirements of BLM's 43 CFR 3809.550 et seq. Staff acknowledges the uncertainty in planning for conditions 30 to 50 years in the future, but the Decommissioning and Closure Plan cannot defer establishing reasonable performance standards and goals until that time.

Therefore, with proposed Condition of Certification BIO-23 and the eventual return of the lands to their current state, the land use effects of decommissioning would be short term and not adverse.

C.6.4.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the 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 Rangeland Management

As discussed above in detail in Section C.6.4.2 (under the subsection entitled "Agricultural Lands and Rangeland Management") no farmland or rangeland used for

livestock grazing would be converted by the proposed project. In addition, construction of the proposed project and its associated linear facilities would be temporary, and the project would not involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural uses. Therefore, proposed project impacts on agricultural lands and rangeland management would be less-than-significant.

Wilderness and Recreation

As discussed above in detail in Section C.6.4.2 (under the subsection entitled "Wilderness and Recreation"), the conversion of 1,890 acres of land to support the proposed project's components and activities would directly disrupt current recreational activities in established federal recreation areas and would result in adverse effects on recreational users of these lands. Due to the limited use of these recreational resources and existing BLM restrictions, however, the disruption to recreation would be less-than significant.

The proposed project would not substantially reduce the scenic, biological, or cultural values of federal wilderness areas. Thus, land use impacts to the area's wilderness areas would be less-than-significant.

Horses and Burros

As discussed above in detail in Section C.6.4.2 (under the subsection entitled "Horses and Burros"), the proposed project would not contain or traverse any established BLM HAs or HMAs. Therefore, the proposed project would not result in any interference with BLM's management of an HA or HMA. Impacts would be less-than-significant.

Land Use Compatibility and LORS Compliance

As discussed above in detail in Section C.6.4.2 (under the subsection entitled "Land Use Compatibility"), the project would not physically divide or disrupt an established community. Impacts would be less-than-significant.

As the proposed project is located wholly on BLM-administered land, no state, regional, or local land use LORS are applicable to the proposed project. Staff's analysis of the proposed project's consistency with applicable federal land use LORS is presented in **LAND USE Table 3.** The proposed project would be consistent with applicable federal land use LORS. With BLM's approval of a project-specific CDCA Plan Amendment, the proposed project would fully conform to the CDCA. Therefore, impacts associated with compliance with federal land use LORS would be less than significant.

Cumulative Land Use Effects

Section C.6.8 (below) provides a detailed analysis of cumulative impacts. As discussed below, the potential combined development of approximately one million acres of land in the southern California desert, 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 (including areas with high soil quality and agricultural resources) 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 GSEP would have no impacts on agricultural resources or rangelands, it would have no potential to contribute to cumulative impacts in this respect.

The GSEP's potential to disrupt recreational activities would be limited and less than cumulatively considerable when considered in the context of past, present and reasonably foreseeable future projects. However, the GSEP would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Chuckwalla Valley and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.6.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.6.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project site. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.6.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Agricultural Lands and Rangeland Management

While the Reduced Acreage Alternative would reduce any land conversion impacts by 50 percent, as discussed above in detail in Section C.6.4.2 (under the subsection entitled "Agricultural Lands and Rangeland Management"), no farmlands or rangelands used for livestock grazing would be converted. In addition, construction activities associated with the proposed project and its 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.

Finally, given that this alternative would be located wholly on BLM-administered land, state land preservation contracts (i.e., Williamson Act Contract), and county zoning for agricultural use would not be affected.

Therefore, the types of effects on agricultural lands and rangeland management resulting from this alternative would be the same as the proposed project, but less intense given the reduced size of the site.

Wilderness and Recreation

The conversion of 990 acres of land to support the components and activities associated with this alternative would disrupt current recreational activities, although due to the remote nature of the site along with the BLM's existing restrictions on recreational activities in the area, direct impacts to recreation use of the alternative project site would be limited. Construction of the transmission line would traverse a single "open" route and result in disruptions to motorized vehicle use along this route. As the transmission line would be strung over the route, however, it would not permanently disrupt use of the route. Any impacts on the route by the linear ROW would be temporary and short-term.

This alternative would not be constructed on wilderness lands so it would not directly disrupt activities in a federal wilderness area

This alternative would have similar effects on wilderness and recreation resources that the proposed project would, but these effects would be less intense due to the reduction in the size of the project by 50 percent. Thus, this alternative would not substantially reduce the scenic, biological or cultural value of a wilderness area or recreational resources.

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HAs or HMAs. Therefore, the Reduced Acreage Alternative would not result in any interference with BLM's management of an HA or 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 3.** These federal LORS would apply to this alternative. Similar to the proposed project, this alternative would be consistent with applicable federal land use LORS. With BLM's approval of a project-specific CDCA Plan Amendment, the proposed project would fully conform with the CDCA.

Cumulative Land Use Effects

This alternative would result in the conversion of 990 acres of undeveloped open space with an industrial utility use (i.e., a 125 MW power plant and associated infrastructure). When compared to the proposed project, this alternative would result in approximately 50 percent less land conversion to industrial uses, and the cumulative effects of this amount of land conversion when combined with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. Section C.6.8 (below) provides a detailed analysis of cumulative impacts. The potential combined

development of approximately one million acres of land in the southern California desert, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. In general, the conversion of vast amounts of open space lands would preclude numerous existing land uses including recreational activities, rangeland management, and open space, and therefore, result in a significant cumulative land use impact.

Because this alternative would have no impact on agricultural resources or rangelands, it would have no potential to contribute to cumulative impacts in this respect. This alternative's potential to disrupt recreational activities would be limited and less than cumulatively considerable when considered in the context of past, present and reasonably foreseeable future projects. However, this alternative would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Chuckwalla Valley and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.6.5.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangeland Management

As discussed above in subsection C.6.5.2, and similar to the proposed project, impacts resulting from this alternative on agricultural and rangelands used for livestock grazing would be less-than-significant.

Wilderness and Recreation

As discussed above in subsection C.6.5.2, 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.6.5.2, and similar to the proposed project, impacts resulting from this alternative on horses and burros would be less-than-significant.

Land Use Compatibility and LORS Compliance

As discussed above in subsection C.6.5.2, and similar to the proposed project, this alternative would comply with federal LORS. Therefore, impacts would be less-than-significant.

Cumulative Land Use Effects

As discussed above in subsection C.6.5.2, and similar to the proposed project, the cumulative land use impacts of this alternative when combined with other existing, planned, and proposed projects would be significant and unavoidable.

C.6.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It

is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in Alternatives Figure 2 (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) per unit to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

C.7.6.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project site. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.7.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Dry Cooling Alternative and use of the ACC system would not require any additional use of land or any additional ground disturbing activities. In regard to land use, the impacts of the Dry Cooling Alternative in comparison to the proposed project would primarily include increased noise and increased facility size and bulk. However, because the increased facility size and bulk would occur within the GSEP site, impacts to land use would be expected to be similar as with the proposed GSEP project.

Because the ACC system is approximately 98-120 feet in height, the ACC system would be more visible from the surrounding areas. The Palen/McCoy Wilderness and several areas of critical environmental concern (ACEC) are located within the vicinity of the proposed GSEP site. As such, the ACC system would be visible from the Palen/McCoy Wilderness and ACECs and would potentially be more visible than the proposed GSEP with use of the wet-cooled system. However, even without the ACC system, the GSEP and the 1,800 acre fields of solar troughs would be visible from the Palen/McCoy Wilderness. For a detailed discussion of this alternatives visual impacts, please see the **Visual Resources** section of this document.

Agricultural Lands and Rangeland Management

The Dry Cooling Alternative and use of the ACC system would not require any additional use of land or any additional ground disturbing activities. In regard to land use, the impacts of the Dry Cooling Alternative in comparison to the existing facility would primarily include increased noise and increased facility size and bulk. However,

because the increased facility size and bulk would occur within the GSEP site, impacts to land use would be expected to be similar as with the proposed GSEP project. As discussed above in detail in Section C.6.4.2 (under the subsection entitled “Agricultural Lands and Rangeland Management”), no farmlands or rangelands used for livestock grazing would be converted. In addition, construction activities associated with the proposed project and its 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.

Finally, given that this alternative would be located wholly on BLM-administered land, state land preservation contracts (i.e., Williamson Act Contract), and county zoning for agricultural use would not be affected.

Therefore, the types of effects on agricultural lands and rangeland management resulting from this alternative would be the same as the proposed project.

Wilderness and Recreation

The conversion of 1,890 acres of land to support the components and activities associated with this alternative would be the same as described for the proposed project. Similar to the proposed project, the Dry Cooling Alternative would disrupt recreational activities such as backpacking, camping, rockclimbing, hunting, or other activities by the removal of 1,890 acres from recreational use. The remote location of the site and the BLM’s existing OHV use restrictions limit the direct impacts to these recreation uses. Construction of the transmission line would traverse a single “open” route and result in disruptions to motorized vehicle use along this route. As the transmission line would be strung over the route, however, it would not permanently disrupt use of the route. Any impacts on the route by the linear ROW would be temporary and short-term.

This alternative would not be constructed on wilderness lands so it would not directly disrupt activities in a wilderness area. The operational impacts of the Dry Cooling Alternative would be greater than the proposed project as a result of the greater bulk and noise of the ACCs. For a detailed discussion of this alternative’s noise and visual impacts, please see the **Noise** and **Visual Resources** sections of this document. This alternative would not substantially reduce the scenic, biological, or cultural value of a wilderness area or recreational facility (see the **Visual Resources**, **Biological Resources** and **Cultural Resources** sections of this document).

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HAs or HMAs. Therefore, the Dry Cooling Alternative would not result in any interference with BLM’s management of an HA or 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 3.** These federal LORS would apply to this alternative. Similar to the proposed project, this alternative would be consistent with applicable federal land use LORS. With BLM's approval of a project-specific CDCA Plan Amendment, the proposed project would fully conform to the CDCA.

Cumulative Land Use Effects

This alternative would result in the conversion of 1,890 acres of undeveloped open space with an industrial utility use (i.e., two 125 MW power plants and associated infrastructure). The potential combined development of approximately one million acres of land in the southern California desert, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. In general, the conversion of vast amounts of open space lands would preclude numerous existing land uses including recreational activities, rangeland, and open space, and therefore, result in a significant cumulative land use impact. Because this alternative would have no impact on agricultural resources or rangelands, it would have no potential to contribute to cumulative impacts in this respect.

This alternative's potential to disrupt recreational activities would be limited and less than cumulatively considerable when considered in the context of past, present and reasonably foreseeable future projects. However, this alternative would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Chuckwalla Valley and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.7.6.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangeland Management

As discussed above in subsection C.6.5.2, and similar to the proposed project, impacts resulting from this alternative on agricultural and rangeland management would be less-than-significant.

Wilderness and Recreation

As discussed above in subsection C.6.5.2, 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.6.5.2, and similar to the proposed project, impacts resulting from this alternative on horses and burros would be less-than-significant.

Land Use Compatibility and LORS Compliance

As discussed above in subsection C.6.5.2, and similar to the proposed project, this alternative would comply with federal LORS. Therefore, impacts would be less-than-significant.

Cumulative Land Use Effects

As discussed above in subsection C.6.5.2, and similar to the proposed project, the cumulative land use impacts of this alternative when combined with other existing, planned, and reasonably foreseeable projects would be significant and unavoidable.

C.6.7 NO PROJECT/NO ACTION ALTERNATIVES

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

NO PROJECT/NO ACTION ALTERNATIVE #1

No Action on Genesis Solar Energy Project application and on CDCA land use plan amendment

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 uses described and approved in the CDCA 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 land disturbance. As a result, the land use-related impacts of the Genesis Solar Energy Project would not occur at the proposed site. The conversion of 1,890 acres of land resulting from construction of the proposed project would not occur. In addition, recreationists would continue to be able to use the lands affected by the proposed project occurring under existing conditions. 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 and industrial uses in the area (i.e., Palen Power Solar Project, Blythe Solar Power Project, Mule Mountain Solar Project, McCoy Soleil Project, etc.), the specific size, type, and timing of such use would be unknown. 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 Genesis Solar Energy Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC and BLM, and BLM would amend the CDCA 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 the use of different amounts of land; however, it is expected that all utility solar

technologies would require the use of large amount of the site. As a result, construction and operation of the solar technology would likely result in the conversion of 1,890 acres of land and would create impacts to existing uses of the land, including recreational users. As such, this No Project/No Action Alternative could result in the conversion of 1,890 acres of land similar to the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3

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

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 described and approved in the CDCA 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, and the conversion of 1,890 acres of land as a result of the proposed project would not occur. Recreationists would continue to be able to use the lands affected by the proposed project as is occurring under existing conditions. As a result, the use of the site is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts from the conversion of 1,890 acres of land at the project 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 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 Figure 1** 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 2, I-10 Corridor 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 I-10 Corridor 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.

Geographic Extent

The geographic scope for the analysis of cumulative impacts on land use encompasses Riverside County. As agricultural land statistics and characteristics are typically collected at the county level, cumulative impacts to agricultural land and rangeland management should be evaluated within the context of Riverside County and rangeland administered by BLM throughout the Riverside County region. Recreational opportunities primarily include OHV use and dispersed camping throughout the county. Likewise, wilderness areas and ACECs are located throughout Riverside County. While no HAs and HMAs would be affected by the proposed project, the geographic scope for the analysis of cumulative impacts related to horses and burros includes the Riverside County region to encompass other HAs and HMAs. Projects related to cumulative land use impacts consist of all construction activities and residential and industrial developments within the region. 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. For the purpose of this analysis, in addition to the projects listed in **Cumulative Tables 2 and 3,** data obtained from the NRCS, the U.S. Census, and the BLM's online GIS maps were considered when identifying activities that could contribute to cumulative land use impacts.

Effects of Past and Present Projects

A wide variety of past and present development projects contribute to the cumulative conditions for land use. As noted above in the "Setting and Existing Conditions" subsection for agricultural lands, the majority of the county's agricultural land is surrounded by the county's largest urban areas. According to the DOC, from 2006 to 2008, approximately 3 percent of Riverside County agricultural land was converted to non-agricultural uses (DOC 2008). This is an example of the decline in agricultural acreage throughout this portion of Riverside County. As a result, past and present residential, commercial, and industrial development has contributed to the conversion of existing rural and open space land uses, including agriculture, to other land uses. In regards to rangeland, three livestock grazing allotments are located within Riverside County. The BLM allotment closest to the project site is the Keough allotment north of the proposed project. Past and present projects contribute to the cumulative baseline conditions for rangeland management, including industrial and military developments.

Existing recreation and wilderness areas throughout the county are abundant and maintained by the BLM and California State Parks. However, past and present developments, in particular BLM ACECs, occupy significant portions of areas that could be used for recreation activities. The Chocolate-Mule Mountains HMA is the closest herd management area, which is located approximately 2 miles southeast of the project site near the California-Arizona border. This area is not notable for significant past or present development. Past and present projects occurring in the vicinity of the proposed

project site include recreational activities proposed by the BLM, energy development in and around Blythe, and development of the existing state prisons south of I-10.

Effects of Reasonably Foreseeable Future Projects

As shown in **Cumulative Tables 1a, 1b, 2 and 3** renewable energy projects are proposed throughout the California desert lands. According to **Cumulative Tables 1a** and **1b**, a total of 72 projects and 649,440 acres of solar energy and 61 projects and 433,721 acres of wind energy are currently proposed for development in the California desert lands. This represents a worst-case scenario and not all of these projects would be ultimately developed. As shown in **Cumulative Figures 1 and 2,** one other energy application is proposed in areas surrounding the Chocolate-Mule Mountains HMA.

Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction. The construction of the Genesis Solar Energy Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the Genesis Solar Energy Project. As a result, there may be substantial short term impacts during construction of those cumulative projects related to land use. These short-term impacts would include dust, noise, and traffic. Because the project would not be constructed on wilderness lands the short-term construction impacts would not directly disrupt activities in a federal wilderness area, including, as described above, the Palen/McCoy Wilderness north of the project site, the 3,632-acre Palen Dry Lake ACEC southwest of the project site, and the 2,273-acre Chuckwalla Valley Dune Thicket ACEC approximately two miles southeast of the Project site.

Condition of Certification **TRANS- 1** encourages applicants of the Palen, Blythe, and Genesis projects work to coordinate construction schedules in a manner that facilitates the movement of construction workers during overlapping construction periods in a manner that will minimize traffic on I-10 and transport workers to their respective job sites along the I-10.

Operation. The operation of the Genesis Solar Energy Project is expected to result in long term adverse impacts during operation of the project related to land use. It is expected that some of the cumulative projects described above may be operational at the same time as the Genesis Solar Energy Project. As a result, there may be substantial long term impacts during operation of those cumulative projects related to land use.

The proposed project would not convert any agricultural land to a nonagricultural use. The cumulative impacts of additional development projects that would convert the county's agricultural land to non-agricultural uses and conflict with agricultural operations, could be cumulatively considerable over time. However, all development projects must go through environmental review and be in compliance with all applicable LORS. Because the proposed project would not convert any agricultural land or rangeland to nonagricultural uses, the GSEP's contribution to cumulative impacts to agricultural resources and rangelands would be less than significant under CEQA.

The proposed project would permanently change the nature of land use at the proposed project site from Government Special Public Limited Use to an intensive utility for the generation of power. Although the proposed project's effects on recreation and wilderness areas would be less than significant, the combined effect of the overall cumulative past, present, and proposed and reasonably foreseeable projects in eastern Riverside County could adversely affect recreation and wilderness resources. The GSEP's potential to disrupt recreational activities would be limited and less than cumulatively considerable when considered in the context of past, present and reasonably foreseeable future projects. However, the GSEP would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Chuckwalla Valley and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

Although the proposed GSEP facility would not adversely impact horses or burros, there are other present or reasonably foreseeable future actions that could contribute to impacts to HAs and 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 the 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 HAs and HMAs, development projects would be required to consider impacts related to wild horses and burros. Therefore, the GSEP would not contribute to a cumulative significant adverse impact to this resource.

Proposed developments near the project site that would have the potential to induce cumulative impacts include five transmission line projects, thirteen solar energy generation projects, and numerous residential developments. 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 would not create physical divisions of established residential communities.

Decommissioning. The decommissioning of the Genesis Solar Energy Project is expected to result in adverse impacts related to land use 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 30 years. As a result, there may not be impacts related to land use during decommissioning of the Genesis Solar Energy Project generated by the cumulative projects. However, due to the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the impacts of the decommissioning of the Genesis Solar Energy Project would not be expected to contribute to cumulative impacts related to wilderness and recreation resources. Therefore, the effects of decommissioning on land use are not expected to be adverse.

C.6.9 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.6.4.2, and **LAND USE Table 3** (Project Compliance with Adopted Land Use LORS).

C.6.10 NOTEWORTHY PUBLIC BENEFITS

The proposed project would, for the life of the project, change the nature of land use from BLM-administered open space land, 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 Genesis Solar Energy Project site would result in approximately 1,890 acres of total permanent surface disturbance, converting the land from BLM-administered public land to solar energy capture and energy conversion apparatus, attendant outbuildings, supporting structures, roadways, and parking lots; and
- there would be a loss of recreational use at the project site that is used for dispersed camping and associated OHV use.

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.

C.6.11 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No Conditions of Certification are proposed for this project.

C.6.12 CONCLUSIONS

- No farmland conversion impacts are expected as a result of linear facilities' construction, and the proposed project would not involve other changes in the existing environment which could result in conversion of farmland, to non-agricultural uses.
- No conversion of rangelands would occur, nor would they be adversely affected by construction or operation of the proposed project.
- The conversion of 1,890 acres of land to support the components and activities associated with the project would disrupt current recreational activities, although due to the remote nature of the site along with the BLM's existing restrictions on recreational activities in the area, direct impacts to recreation use of the project site would be less than significant. Construction of the transmission line would traverse a single "open" route and result in disruptions to motorized vehicle use along this route. As the transmission line would be strung over the route, however, it would not permanently disrupt use of the route.

- The Palen/McCoy Wilderness north of the project site, the Palen Dry Lake ACEC, and the Chuckwalla Valley Dune Thicket ACEC attract visitors based on their scenic, biological, cultural, and recreational amenities. The proposed project would not substantially reduce the scenic, biological or cultural value of a wilderness area.
- The proposed project would not contain or traverse any established BLM HAs or HMAs, and the Chocolate-Mule Mountains HMA and HA are approximately 2 miles southeast of the proposed project site. In addition, following construction, fencing around the site would keep any burros outside of the proposed project location. Therefore, the proposed project would not result in any interference with BLM's management of an HMA or HA.
- 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 ROW to construct the proposed project and its related facilities. Pursuant to the 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.
- As the proposed project would be located wholly on BLM administered land, no state, regional, or local land use LORS would be applicable to the project. Based on staff's independent review of applicable federal LORS documents, the proposed project would be consistent with applicable land use LORS.
- 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.6.4.3 (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. As proposed, the project would be in compliance with all LORS.
- The land use impacts associated with the Reduced Acreage Alternative would be similar to the proposed project, but less intense given that 50 percent less lands would be affected.
- The land use impacts associated with the Dry Cooling Alternative would be similar to the proposed project, with more bulk and noise due to the ACCs.
- 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. 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 GSEP would have no impacts on agricultural resources or rangelands, it would have no potential to contribute to cumulative impacts in this respect. The GSEP's potential to disrupt recreational activities would be limited and less than cumulatively considerable when considered in the context of past, present and reasonably foreseeable future projects. However, the GSEP would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Chuckwalla Valley and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.6.13 REFERENCES

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C.7 - NOISE AND VIBRATION

Testimony of Erin Bright

C.7.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff concludes that the Genesis Solar Energy 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.7.2 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 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 Genesis Solar Energy Project (Genesis) 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.7.3 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 ground-borne vibration or ground-borne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Energy Commission staff, in applying item 3 above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by 5 dBA or more at the nearest sensitive receptor. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.

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 expressed at workshops or hearings or in correspondence.

Noise impacts due to construction activities are usually considered to be insignificant 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, including the minority population.

[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 Riverside County General Plan - Noise Element Riverside County Noise Ordinance	 Establishes acceptable noise levels. Limits hours of noisy construction.

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.

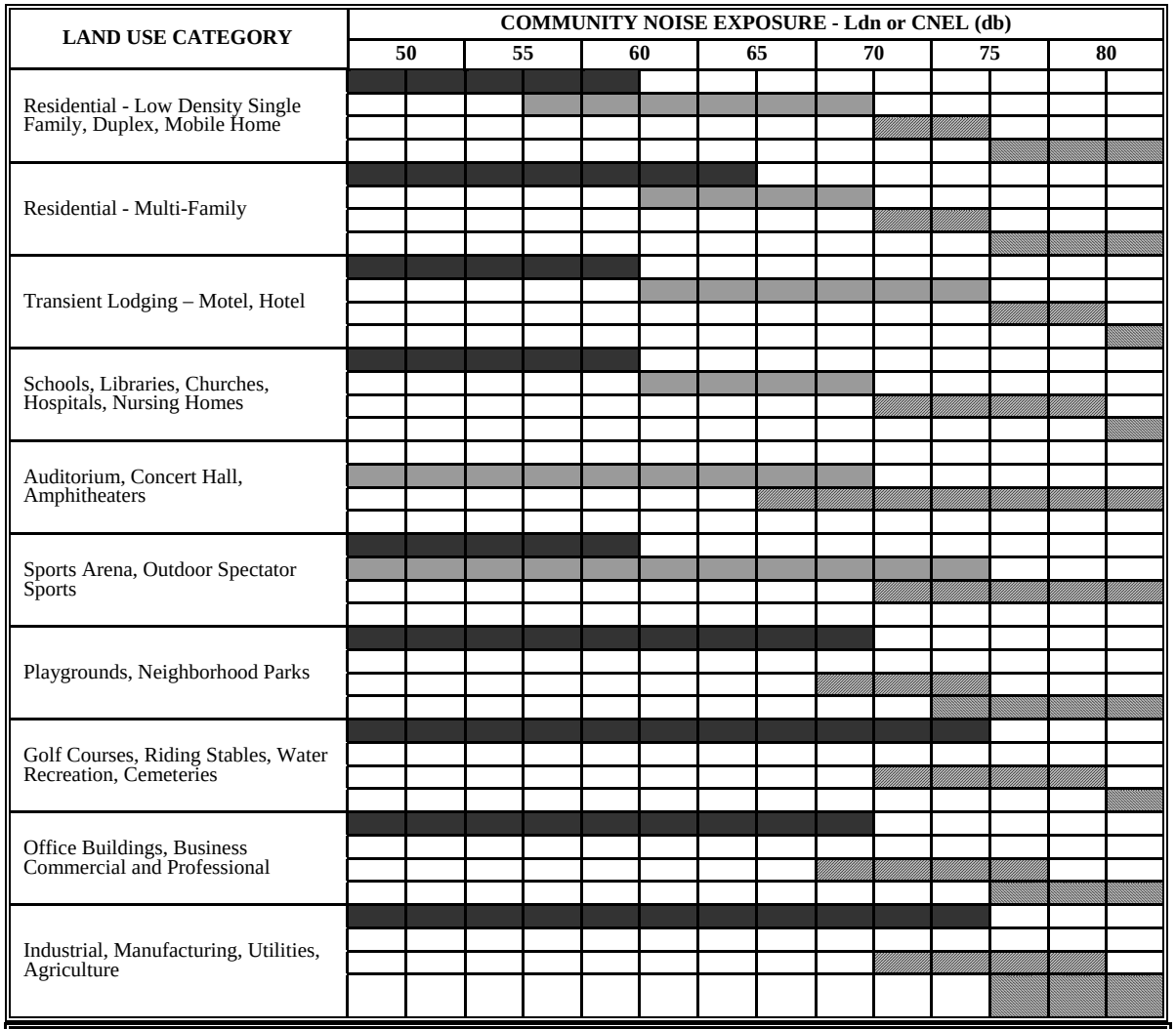
STATE

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.

The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, §§ 5095–5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards (see the **Worker Safety and Fire Protection** section of this document, and **NOISE Appendix A, Table A4**).

LOCAL

Riverside County General Plan Noise Element

The Noise Element of the Riverside County General Plan contains standards, policies and procedures that are intended to minimize noise impacts to the community (Riverside 2008). The noise level standards for new projects, including non-transportation noise sources, employ the Community Noise Equivalent Level (CNEL) or Day-Night Level (L_{dn}), and are similar to those shown by **Noise Table 2**. Specifically, the County Noise Element standards for residential land uses are: Normally Acceptable: CNEL or L_{dn} up to 60 dB; Conditionally Acceptable: up to 70 dB CNEL or Ldn.

Riverside County Code

Riverside County has adopted restrictions affecting construction noise sources in Ordinance 847 of the Riverside County Code. Construction within one-quarter mile of an occupied residence is prohibited between the hours of 6 p.m. and 6 a.m., except as allowed with the written consent of the building official (Riverside 2007).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

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). This document is intended to meet the requirements of CEQA,.

As noted above, CEQA identifies criteria that may be 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” (Cal. Code Reg., tit. 14 (hereinafter State CEQA Guidelines) Section 15382).

Criteria 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 noise and vibration (and in compliance with CEQA) have been determined using the thresholds listed below.

C.7.4 PROPOSED PROJECT

C.7.4.1 SETTING AND EXISTING CONDITIONS

The proposed Genesis Solar Energy Project would be constructed on a 1,800 acre site located approximately 25 miles west of the town of Blythe in Riverside County. The site is primarily on undisturbed federal land managed by the BLM (GSEP 2009a, AFC §§ 3.2, 5.9.1).

The ambient noise regime in the project vicinity consists of aircraft traffic, highway traffic, wind and wildlife. There are no noise sensitive receptors within 9 miles of the project site, however, two state prisons are located approximately 9 miles southeast of the project site (GSEP 2009a, AFC §§ 1.0, 5.9.1, 5.9.4.1).

Ambient Noise Monitoring

There are no noise sensitive receptors located within nine miles of the project site. The Energy Commission's siting regulations only require ambient noise measurements when it is likely that operational or construction noise from a project will increase the ambient noise levels at nearby noise sensitive receptors by 5 dBA or more. Given that there are no noise sensitive receptors located within nine miles of the project site, and that the ambient noise regime in the surrounding area includes highway traffic and aircraft traffic, it is extremely unlikely that the ambient noise at the nearest noise sensitive receptor (more than nine miles away from the project site) would be low enough that attenuated project noise would cause a 5 dBA increase in the ambient noise level. Thus, staff agrees with the applicant that ambient noise monitoring is not required.

C.7.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and by normal long-term operation of the power plant.

Construction Impacts and Mitigation

Construction of Genesis is expected to occur over a period of 37 months (GSEP 2009a, AFC § 3.7.1). Each unit of the project is expected to require approximately 25 months to be constructed, with the construction of each unit overlapping by 12 months.

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances.

The Applicant has predicted that there will be no noise impacts due to project construction on the nearest sensitive receptors (GSEP 2009a, AFC §§ 5.9.4.1, 5.9.5.1, Table 5.9-5). Assuming an average construction noise of 93 dBA L_{eq} at 50 feet from the noise center (the upper range of noise levels for construction equipment), project construction noise would attenuate to 39 dBA at a distance of five miles from the acoustic center. Project construction noise would further attenuate to 34 dBA at the state prisons, 9 miles away.

There are no LORS that limit construction noise levels for the project. The Riverside County Code prohibits noisy construction work to daytime hours when a project is within one-quarter mile of a noise sensitive receptor. Given the distance between the

proposed project site and the nearest noise sensitive receptor, this limitation does not apply. No limit on construction hours needs to be enforced for the Genesis project.

CEQA Impacts

Power Plant Site

To evaluate construction noise impacts, staff compares the projected noise levels to the ambient levels. Since construction noise typically varies continually with time, it is most appropriately measured by, and compared to, the L_{eq} (energy average) metric.

Ambient noise levels were not measured because there are no noise sensitive receptors within 9 miles of the project site. Aggregate construction noise would attenuate to less than 35 dBA at a distance of nine miles from the project site, which is generally considered to be very quiet. Given the lack of receptors in the vicinity of the project site, staff considers the noise impacts due to construction activity to be insignificant.

In the event that actual construction noise should annoy nearby residents, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a public notification process to notify nearby residents of the project construction and operation, and a Noise Complaint Process that would require the applicant to resolve any complaints regarding project noise.

Linear Facilities

Linear facilities include a new six-mile natural gas pipeline connecting to an existing Southern California Edison pipeline located north of highway I-10, as well as new electrical transmission lines interconnecting to the transmission system to the southeast of the project site. Both the natural gas pipeline and the transmission lines would extend past the project site boundaries; neither would pass close to noise sensitive receptors (GSEP 2009a, AFC Figure 5.12-1).

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feedwater and steam systems, the piping and tubing that comprises the steam path has accumulated dirt, rust, scale and construction debris such as weld spatter, dropped welding rods and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. High pressure steam is then raised in a heat recovery steam generator (HRSG) or a boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a steam blow, is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, is performed several times daily over a period of two or three weeks. At the end of this procedure, the steam line is connected to the steam turbine, which is then ready for operation.

These steam blows can produce noise as loud as 130 dBA at a distance of 100 feet. This would attenuate to about 82 dBA at a distance of five miles from the project site, and 77 dBA at the prisons nine miles from the project site. While this is an annoying noise level, even at these great distances from the project site, there are no noise sensitive receptors within these distances and the noise would attenuate further with greater distances. Staff concludes that steam blows would likely not cause a significant impact.

Pile Driving

The applicant does not explicitly state that pile driving would be necessary for construction of Genesis. However, staff has analyzed the potential noise impacts of pile driving in case it is found necessary during the construction process. If pile driving is required for construction of the project, the noise from this operation could be expected to reach 101 dBA at a distance of 50 feet (GSEP 2009a, AFC Table 5.9-5). Pile driving noise would thus be projected to reach levels of 47 dBA at distance of five miles from the project site, and 42 dBA at the prisons nine miles from the project site. Impacts due to pile driving, if it should occur, would not be significant.

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving, should it be employed. Vibration attenuates rapidly; it is likely that no vibration would be perceptible at any appreciable distance from the project site. Staff therefore believes there would be no significant impacts from construction vibration.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized those applicable LORS that would protect construction workers (GSEP 2009a, AFC § 5.9.5.4). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**, below.

Operation Impacts and Mitigation

The primary noise sources of Genesis include the steam turbine generators, cooling tower, start-up boiler, and various pumps and fans (GSEP 2009a, AFC §§ 3.5.1, 5.9.5.2; Table 5.9-7). Staff compares the projected noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

Common noise mitigating factors included in parabolic trough solar thermal generating facilities include:

- metal acoustical steam turbine enclosure; and
- 25-foot high solar mirror arrays surrounding the power block.

Compliance with LORS

The applicant did not perform full noise modeling for project operation because there were no noise sensitive receptors in the vicinity of the project that would be impacted by operating noise (GSEP 2009a, AFC §§ 5.9.4.1, 5.9.5.2; Figure 3.2-1).

The applicant estimates that project operational noise levels would be less than 30 dBA at a distance of five miles; staff considers this a reasonable estimation. Project operating noise would thus comply with the standard set by the Riverside County General Plan (60 dBA CNEL at the nearest receptor).

CEQA Impacts

Power plant noise is unique. Essentially, a power plant operates as a steady, continuous, broadband noise source, unlike the intermittent sounds that comprise the majority of the noise environment. As such, power plant noise contributes to, and becomes part of, the background noise level, or the sound heard when most intermittent noises cease. Where power plant noise is audible, it will tend to define the background noise level. For this reason, staff compares the projected power plant noise to the existing ambient background (L_{90}) noise levels at the affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be incorporated in the project to reduce or remove the impact.

In many cases, a power plant will be intended to operate around the clock for much of the year. As a solar thermal generating facility, Genesis would operate only during the daytime hours, typically 15 hours per day during the summer (with fewer hours during the fall, winter, and spring), when sufficient solar insulation is available. Typically, daytime ambient noise consists of both intermittent and constant noises. The noise that stands out during this time is best represented by the average noise level, or L_{eq}. Thus, staff normally compares a project's daytime noise levels to the daytime ambient L_{eq} levels at the project's noise-sensitive receptors.

As noted above, there are no sensitive receptors within nine-miles of the project site. The applicant has predicted that project operational noise levels would attenuate to less than 30 dBA at a distance of five miles from the project site, which would attenuate further at greater distances. At the state prisons located nine miles from the project site, project operating noise would attenuate to less than 25 dBA, which is a very quite level for daytime ambient even in rural areas. Given the distance, and thus the amount of noise attenuation, project noise levels would not be expected to be higher than ambient values at the prison or any noise sensitive receptors further away. No change in ambient noise would be expected to result from plant operation.

Tonal Noises

One possible source of disturbance would be strong tonal noises. Tonal noises are individual sounds (such as pure tones) that, while not louder than permissible levels, stand out in sound quality. The applicant plans to avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design. Given the lack of noise sensitive receptors within the vicinity of the project, tonal noises would not be expected to cause annoyance.

Linear Facilities

The electrical interconnection line would not pass by any noise sensitive receptors and would thus not be expected to have any effects. Additionally, noise effects from electrical interconnection lines typically do not extend beyond the right-of-way easement of the line and thus are generally inaudible to any nearby receptors.

Vibration

Vibration from an operating power plant could be transmitted by two chief means; through the ground (groundborne vibration) and through the air (airborne vibration).

The operating components of the Beacon project consist of a high-speed steam turbine generator and various pumps and fans. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors are attached to the turbines and generators. Based on experience with numerous previous projects employing similar equipment, Energy Commission staff believes that ground borne vibration from Genesis would be undetectable at distances greater than a few hundred feet from the power block. Given that there are no receptors within nine miles of the project, vibration would not have an impact on any receptors.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that Genesis would cause perceptible airborne vibration effects.

Worker Effects

The applicant has acknowledged the need to protect plant operating and maintenance workers from noise hazards and has committed to comply with applicable LORS (GSEP 2009a, AFC § 5.9.5.4). To ensure that plant operation and maintenance workers are, in fact, adequately protected, Energy Commission staff has proposed Condition of Certification **NOISE-4**, below.

FACILITY CLOSURE

In the future, upon closure of Genesis, all operational noise from the project would cease, and no further adverse noise impacts from operation of Genesis would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment and any site restoration work that may be performed. Since the noise would be similar to that caused by the original construction, it would likely cause no noise impacts given the remote location of the project. Any noise LORS that are in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply unless modified by the Energy Commission.

C.7.4.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the significance of construction and operating noise impacts of the proposed project at the nearest sensitive receptors has been determined.

Construction Impacts

As discussed in detail in section C.7.4.2 above (under the subsection entitled "Construction Impacts and Mitigation"), there are no noise sensitive receptors within nine miles of the project that would be impacted by construction noise; the impacts due to construction noise are considered insignificant.

Operation Impacts

As discussed in detail in section C.7.4.2 above (under the subsection entitled "Operation Impacts and Mitigation"), power plant noise levels are predicted to be less than 30 dBA L_{eq} at a distance of five miles from the project site during daytime operation, which would not likely result in an increase over ambient noise. No change in ambient noise at any sensitive receptor at night would result from plant operation. Thus, operation noise impacts of the project would be insignificant.

C.7.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.7.5.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.7.5.2 Assessment of Impacts and Discussion of Mitigation

The Reduced Acreage alternative would most likely correspond to lower operational, given that only half of the noise generating equipment (steam turbine generator, wet cooling tower, etc) would be included in the project. Because there are no noise sensitive receptors within the vicinity of the project, noise impacts for the Reduced Acreage alternative would most likely be the same, as for the proposed project, which as discussed above in section 10.4.2 are insigificant.

Because this alternative would result in fewer construction activities conducted at greater distances from sensitive receptors than the proposed project, the analysis for the proposed project demonstrates that the Reduced Acreage alternative can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards. Also, if built in accordance with the conditions of certification proposed for the proposed project, it would produce no significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

C.7.5.3 CEQA Level of Significance

Like the proposed project, the Reduced Acreage alternative, if built and operated in conformance with the proposed conditions of certification defined for the proposed project, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

C.7.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

C.7.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.7.6.2 Assessment of Impacts and Discussion of Mitigation

The use of a Dry Cooling Alternative would introduce additional noise sources to the overall plant design, consisting of fans, motors, and gearboxes, but would eliminate cooling tower noise (a noise source that significantly contributes to project noise levels). The overall difference in project noise level between dry cooling and wet cooling would be small.

The far field noise level for the Dry Cooling Alternative is expected to be approximately 60 dBA at 400 feet (GSEP 2009f). This level would attenuate to approximately 47 dBA at the facility fenceline (approximately 1,800 feet from the proposed position of the ACC) and approximately 25 dBA at a distance of five miles from the project site, compared to less than 30 dBA at five miles for the proposed project. As with the

proposed cooling system, no change in ambient noise levels at any noise sensitive receptor would result from the project because there are no such receptors within the vicinity of the project. If the project were to use dry cooling, noise impacts would be insignificant.

C.7.6.3 CEQA Level of Significance

No new impacts to noise and vibration would be created with use of ACCs in place of cooling towers. The overall impact of the project with dry cooling would be similar to that of the proposed project.

C.7.7 NO PROJECT/NO ACTION ALTERNATIVES

No Project/No Action Alternative #1:

No Action on Genesis Solar Energy Project application and on CDCA land use plan amendment

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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. As a result, the construction and operation noise-related impacts of the Genesis Solar Energy Project would not occur at the proposed site. 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 Genesis Solar Energy Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 use different machinery during construction and would create different ambient noise levels during operation; however, it is expected all technologies would require the use of large construction vehicles that would create unwanted noise and some intermittent

noise during operations. However, as with the proposed project, it is expected that solar technologies create minor increases in ambient noise during operation. As such, this No Project/No Action Alternative could result in an impact from increased ambient noise during construction and operation similar to under the proposed project.

No Project/No Action Alternative #3:

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

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 with the existing ambient noise from its existing condition. Ambient noise of the site is not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts from any increase in noise at the project 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.7.8 CUMULATIVE IMPACT ANALYSIS

Geographic Extent

The geographic scope for considering cumulative noise impacts on sensitive receptors for this project consists of the region immediately surrounding any identified receptors. There are no noise-sensitive receptors within nine miles of the project site, the fact of which inherently precludes the possibility for cumulative noise impacts from the project.

C.7.9 COMPLIANCE WITH LORS

A detailed discussion of the proposed project's compliance with LORS applicable to noise and vibration is provided above in subsection C.7.4.2.

C.7.10 NOTEWORTHY PUBLIC BENEFITS

The proposed project would affect the daytime ambient noise levels in the immediate project area. While this change would not be noticeable at the sensitive receptors near the project, and thus not significant, development of the proposed project would not result in any noteworthy public benefits.

C.7.11 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

NOISE-1 At least 15 days prior to the start of ground disturbance, the project owner shall notify all residents within two miles of the project site boundaries and one-half mile of linears, by mail or other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project and include that telephone number in the above notice. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction in a manner visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: Prior to ground disturbance, the project owner shall transmit to the Compliance Project Manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed and describing the method of that notification, verifying that the telephone number has been established and posted at the site, and giving that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of Genesis, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- Use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- Attempt to contact the person(s) making the noise complaint within 24 hours;
- Conduct an investigation to determine the source of noise related to the complaint;
- Take all feasible measures to reduce the noise at its source if the noise is project related; and
- Submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including final results of noise reduction efforts, and if obtainable, a signed statement by the complainant stating that the noise problem is resolved to the complainant's satisfaction.

Verification: Within five days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form with the CPM, documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a three-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit to the CPM the noise control program and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.

NOISE-4 Following the project's first achieving a sustained output of 90 percent or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal/OSHA upon request.

C.7.12 RESPONSE TO AGENCY AND PUBLIC COMMENTS

Comment: A comment was received from the applicant regarding the telephone number that would be required by Condition of Certification **NOISE-1** which would allow the public to report any undesirable noise conditions associated with the project. The applicant asserts that, given the isolated location of the project and the distance between the project and the nearest receptor and the closest highway, no noise would be heard and there is, therefore, no reason to have a telephone hotline posted.

Response: The telephone number that would be required by **NOISE-1** is the vehicle by which the noise complaint process described in condition **NOISE-2** is possible; if no telephone number is available then no noise complaints can be submitted by the public in the case that undesirable noise may be heard. Though it might be unlikely that project noise would be heard loud enough to potentially result in a complaint, staff believes it is important to retain the noise complaint process, provide the public with a means of making contact with the project owner and the CEC compliance project manager is key in that process.

C.7.12 CONCLUSIONS

Staff concludes that Genesis, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration LORS and would produce no significant adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Genesis Solar Energy Project
(09-AFC-8)

NOISE COMPLAINT LOG NUMBER _____

Complainant's name and address:

Phone number: _____

Date complaint received: _____
Time complaint received: _____

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: _____

Initial noise levels at 3 feet from noise source _____ dBA Date: _____

Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet from noise source: _____ dBA Date: _____

Final noise levels at complainant's property: _____ dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: _____

(Attach additional pages and supporting documentation, as required).

C.7.13 REFERENCES

Riverside 2008. - Imperial County General Plan, Noise Element.

Riverside 2007 - Riverside County Code of Ordinance, Ordinance 847 Regulating Noise. Effective July 19, 2007.

GSEP 2009a – Genesis Solar Energy Project/T. Bernhardt (tn:) Application for Certification for the Genesis Solar Energy Project. 08/31/2009.

GSEP 2009f – Genesis Solar Energy Project/T. Bernhardt (tn:) Data Responses Set 1A (# 1-227) for the Genesis Solar Energy Project. 12/14/2009.

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NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that “A-weighting” of sound intensities best reflects the human ear’s reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **NOISE Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, those higher levels nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (U.S. Environmental Protection Agency, Effects of Noise on People, December 31, 1971).

To help the reader understand the concept of noise in decibels (dBA), **NOISE Table A2** illustrates common noises and their associated sound levels, in dBA.

NOISE Table A1 Definition of Some Technical Terms Related to Noise	
Terms	**Definitions**
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the noise level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.

Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.

NOISE Table A2 Typical Environmental and Industry Sound Levels			
Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing

Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of 1 dB cannot be perceived.

2. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.

3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.

4. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response (Kryter, Karl D., The Effects of Noise on Man, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). **NOISE Table A3** indicates the rules for decibel addition used in community noise prediction.

NOISE Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988.

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed, as shown in **NOISE Table A4**.

NOISE Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 CFR § 1910.95.

C.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The Socioeconomics and Environmental Justice Section will be included in the Supplemental Staff Assessment.

C.9 - SOIL AND WATER RESOURCES

Testimony of Michael Donovan P.G., C.Hg., Michael Daly P.E.,
Andrew Collison, Ph.D. and John Thornton P.E.

C.9.1 SUMMARY OF CONCLUSIONS

With the information provided to date, the Bureau of Land Management (BLM) and California Energy Commission staff (hereafter jointly referred to as staff) have determined that construction, operation, and decommissioning of the proposed Genesis Solar Energy Project (GSEP, referred to herein as the Project) could potentially impact soil and water resources. Where these 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 specifications for laws, ordinances, regulations and standards (LORS) conformance, included herein as conditions of certification, address the California Environmental Quality Act (CEQA) requirements for the Energy Commission's analysis and BLM's needs for a National Environmental Policy Act (NEPA) analysis. With implementation of the water entitlement or offset measures identified by staff, the Project would conform to all applicable LORS. Staff's conclusions based on analysis of the information submitted are as follows:

1. The proposed Project would be located on an alluvial fan where flash flooding and mass erosion could impact the Project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users. A Draft Drainage, Erosion, and Sedimentation Control Plan (DESCP) has been developed to mitigate the potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. Based on these factors, the proposed Project could result in impacts that would be significant with respect to CEQA significance criteria specified herein and the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA (CEQ NEPA Regulations) significance criteria specified in 40 CFR 1508.27. Therefore, conditions of certification have been developed that define the requirements for reports, plans, monitoring, and inspection, as well as standards and procedures for implementing Best Management Practices (BMPs) during construction and operations. These conditions of certification are included in **SOIL&WATER 1, -8** through **-11,** and **-13**.

2. The proposed Project would be located in an area with no designated entity responsible for maintaining integrity of the rerouted channels. Staff believes the applicant should be required to establish a Channel Maintenance Program as required by Condition of Certification **SOIL&WATER-13**.

3. The proposed Project would have an impact on levels of groundwater in the Chuckwalla Valley Groundwater Basin (CVGB). However, the calculations and assumptions used to evaluate potential groundwater level impacts are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. To ensure that the Project's proposed use of groundwater does not significantly impact the

groundwater levels in the CVGB, staff believes the Project applicant should be required to develop a monitoring program and identify what changes are occurring in basin water levels. Substantial changes to groundwater levels caused by the proposed Project and other pumping in the basin would be documented by this monitoring, and a mitigation and reporting program would be required in accordance with Conditions of Certification **SOIL&WATER-2**, **-3**, **-4,** and **-5**.These measures, along with mitigation identified in the Biological Resources section of this Staff Assessment that will be required for significant impacts to groundwater-dependent vegetation that may occur, will be sufficient to ensure that significant impacts related to changes in groundwater levels do not occur.

The cumulative impact analysis indicates that groundwater extraction during construction and operation of this and other foreseeable projects would place the basin into an overdraft condition. This impact may be exacerbated by other unidentified renewable energy projects in the I-10 corridor, which has been targeted as a potential area for further renewable energy development. However, the amount of water in storage in the basin greatly exceeds the amount of cumulative overdraft, even taking into account the potential for dramatically increased water demand, rendering the project's contribution to this cumulative impact less than cumulatively considerable.

Finally, the cumulative effects may indirectly impact the adjacent Palo Verde Mesa Groundwater Basin by inducing underflow from the Colorado River. To mitigate the potential project's contribution to impacts to the Colorado River, staff recommends adoption of **SOIL&WATER-15**, which would require the applicant to acquire reentitlements or offsets to Lower Colorado River water**.** Staff has also proposed Condition of Certification **SOIL&WATER-19**, which allows the applicant to refine estimates of the amount of induced Colorado River underflow through computer modeling analysis and adjust the required acquisition of entitlements or offsets to Lower Colorado River water accordingly.

4. The applicant proposes to use groundwater for wet cooling when other feasible technologies are available. Staff believes the proposed use of groundwater for wet cooling would not comply with the state's water policies. To address this inconsistency with state water policy, staff recommends implementation of Condition of Certification **SOIL&WATER-18**, which would require the Project owner to reduce the proposed water use through a project design change(s) and/or through a water conservation program.

5. The Project will generate wastewater that will include: reverse osmosis (RO) reject water, cooling blowdown water and sanitary wastewater. The Project proposes to use evaporation ponds to treat the RO reject water and blowdown water; and a sanitary leachfield to treat the sanitary wastewater. Proposed Conditions of Certification **SOIL&WATER-6** and **SOIL&WATER-7** will ensure that the operation of the wastewater treatments systems are in accordance with regulatory requirements and minimize potential impacts to surface and groundwater quality. In addition, proposed Condition of Certification **SOIL&WATER-20** will monitor existing groundwater quality to monitor compliance with the requirements set forth in **SOIL&WATER-6** and **SOIL&WATER-7.**

6. The Project will generate heat transfer fluid (HTF) contaminated soil as results of accidental spills of HTF fluid. The Project proposes to use a Land Treatment Unit (LTU) to treat contaminated soils. Compliance with proposed Condition of Certification **SOIL&WATER-6** will ensure that the operation of the LTU is in accordance with regulatory requirements and will minimize potential impacts to surface and groundwater quality. In addition, proposed Condition of Certification **SOIL&WATER-20** will require the applicant to monitor existing groundwater quality to monitor compliance with the requirements set forth in **SOIL&WATER-6**.

7. The applicant for the Project proposes to use evaporation ponds as the preferred method of wastewater disposal. Notwithstanding the fact that potential impacts related to the use of evaporation ponds to dispose of the industrial wastewater could be mitigated through effective application of state and local LORS,, this method of wastewater disposal is not consistent with the Energy Commission's policy that encourages the use of zero liquid discharge (ZLD) systems that are designed to eliminate wastewater discharge and inherently conserve water. Therefore, staff finds that this method of wastewater disposal does not comply with the state's water policies. As discussed above, to, address this inconsistency with state water policy, staff recommends implementation of Condition of Certification **SOIL&WATER-18**.

8. The applicant proposes to operate a non-transient, non-community water system during operation of the Project. The Project owner will be required to submit all requirements, specifications, certifications to permit and operate of a non-transient, non-community water system as per Condition of Certification **SOIL&WATER-12.** In addition, the applicant will be required to comply with groundwater production reporting requirements following Condition of Certification **SOIL&WATER-16.** Lastly, the applicant will be required to monitor and mitigate potential ground subsidence associated with groundwater production following Condition of Certification **SOIL&WATER-17.**

The state has expressed a strong interest in developing its solar energy resources. However, the construction and operation of solar energy facilities requires the use of water, which state policy also protects. The Energy Commission must balance the state's interest in promoting solar energy development with its interest in conserving and protecting the state's water resources. Several projects currently proposed for the Mojave and Colorado deserts would use water for power plant cooling, which staff believes is contrary to the state's long term interest in maximizing solar power generation and minimizing adverse environmental impacts. This will be an especially critical issue in the renewable development areas that will be identified in the Desert Renewable Energy Conservation Plan (DRECP).

C.9 INTRODUCTION

The proposed action evaluated within this Revised Staff Assessment (RSA) is the construction and operation of the Project, a proposed solar-thermal electricity generation facility located on public lands administered by the BLM in Riverside County, California. The RSA represents an environmental analysis document developed by the

Energy Commission staff to evaluate potential impacts associated with the proposed action.

Genesis Solar, LLC, a Delaware limited liability company and wholly owned subsidiary of NextEra Energy Resources, LLC, (herein referred to as the Project applicant or owner), proposes to construct, own, and operate the Project. The Project consists of two independent solar electric generating facilities with a nominal net electrical output of 125 megawatts (MW) each, for a total net electrical output of 250 MW. The solar steam generators receive heated transfer fluid from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

The Project proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing would be supplied from onsite groundwater wells. Project cooling water blowdown will be piped to lined, onsite evaporation ponds.

The Project applicant has applied for a right-of-way (ROW) grant from the BLM for approximately 4,640 acres of flat desert terrain. Once constructed, the Project would permanently occupy approximately 1,800 acres in the eastern portion of the ROW (the Project footprint), plus approximately 90 acres of linear facilities. The remainder of the acreage in the ROW application is not anticipated to be needed for the Project.

This RSA examines engineering, environmental, public health and safety aspects of the proposed Project, based on the information provided by the applicant and other sources available at the time the RSA was prepared. The RSA contains analyses similar to those normally contained in an Environmental Impact Report (EIR), as the Energy Commission's site certification process has been designated as certified regulatory program pursuant to CEQA.

C.9.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Significance criteria are based on those listed in CEQA Appendix G. Hydrology and water resources impacts would be significant if the project would:

- violate any water quality standards or waste discharge requirements.
- substantially deplete groundwater supplies or interfere 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 alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation onsite/offsite.
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite/offsite,

- create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- otherwise substantially degrade surface water or groundwater quality
- 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.
- have impacts that are individually limited, but cumulatively considerable. ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

C.9.4 PROPOSED PROJECT

Water to supply the Project will be derived from a minimum of two groundwater supply wells located near each unit's power block area. The Project well field will also include a sufficient number of standby wells to provide the Project with water in the event the primary wells are shut down for maintenance. As currently planned, the wells will pump groundwater from the Bouse Formation and/or the underlying Fanglomerate within the Chuckwalla Valley Groundwater Basin. The Bouse Formation occurs at a depth of approximately 260 feet below ground surface (bgs) at the site and extends to approximately 2,050 feet bgs, and the Fanglomerate is inferred to extend from approximately 2,050 to 2,950 feet bgs. On a preliminary basis, the wells are proposed to pump groundwater from below 800 feet bgs.

Construction activities for a single 125 MW unit are expected to take place over a period of approximately 25 months with a 12-month delay between the start of construction for Unit 1 and the start of construction for Unit 2, for a total anticipated construction period of 37 months. It is anticipated that water use during this period will be from on-site groundwater using the production wells that will be installed for the Project. It is anticipated that water usage for the construction period will proceed along the following schedule:

- Average water usage during earthwork (Month 1 to Month 5): 1.7 million gallons per day (mgd),
- Average water usage during post earthwork phase (Month 6 to Month 37: 0.55 mgd.
- Peak water usage: 3 mgd
- Total construction water demand: approximately 2,440 acre feet over approximately 3 years (1 acre-foot equals 325,851.429 gallons).

Initial construction water usage will be in support of site preparation and grading. Subsequent to Month Five of construction, water usage will be in support of dust suppression and normal construction water requirements that are associated with construction of the buildings, power block, and solar array.

The Project will produce four primary wastewater streams and one occasional waste stream:

- Non-reusable sanitary wastewater produced from administrative centers and operator stations;
- Pre-cooling tower water treatment multi-media filter (MMF) waste stream;
- Post-cooling tower water treatment MMF;
- Post-cooling tower water treatment 2nd stage reverse osmosis (RO) waste stream, and
- Occasionally, storm water accumulated in the proposed LTU that will be used to treat soil affected by spills of HTF.

The sanitary wastewater will consist of two separate systems (one at each Power Block) with a capacity of 1,250 gallons per day (gpd) or a total project of 2,500 gpd. Sanitary wastes will be collected for treatment in septic tanks and disposed via leach fields located at each of the two power blocks. Smaller septic systems will be provided for the control room buildings to receive sanitary wastes at those locations.

The second wastewater stream that includes cooling tower blowdown, RO reject water, and boiler blowdown will be directed to one or more of the three 8-acre evaporation ponds that will be located at each Power Block. The evaporation ponds will be double-lined.

For the wet-cooling proposed project, it is expected each 125 MW Power Block unit will have three double-lined evaporation ponds. Each pond will have a top evaporative surface area of 8 acres resulting in a total of 24 acres of evaporation ponds for each unit or a total of 48 acres of ponds for the two 125 MW units. The ponds will be designed and permitted as Class II Surface Impoundments in accordance with Colorado River Basin Regional Water Quality Control Board (CRBRWQCB) requirements, as well as the requirements of the California Integrated Waste Management Board (CIWMB). Multiple ponds are planned to allow plant operations to continue in the event a pond needs to be taken out of service for some reason, *e.g.,* needed maintenance. Each pond will have enough surface area so the evaporation rate exceeds the wastewater production rate at maximum design conditions and annual average conditions.

The average pond depth is eight (8) feet and residual precipitated solids will be removed every 7 years to maintain a solids depth no greater than approximately 3 feet for operational and safety purposes. The ponds will maintain a minimum of 2 feet of freeboard to minimize the potential for overtopping due to 100-year recurrence interval rainfall event.

The pond liner system will consist of a 60 mil high density polyethylene (HDPE) primary liner and a secondary 40 mil HDPE liner. Between the liners is a synthetic drainage geonet and collection piping that is used as part of the leachate collection and removal system (LCRS). A hard surface / protective layer will be constructed on the non-woven geotextile that covers the primary liner. The hard surface will allow for vehicular traffic during unscheduled or emergency maintenance or cleanout. Monitoring of the

evaporation ponds will be required to detect the presence of liquid and/or constituents of concern.

The Project proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing will be supplied from selected onsite groundwater wells. Water from the on-site wells also will be used to supply nonpotable water for employees (*e.g.,* showers, sinks, toilets). A water treatment system will be used to treat the groundwater pumped for domestic use.

The average total annual water usage for each 125 MW power plant is estimated to be about 822 acre-ft/ yr, or 1,605 acre-ft/yr for the entire Project, which corresponds to an average daily flow rate of about 1,000 gallons per minute (gpm) and is presented in **Soil and Water Table 1**.

Soil and Water Table 1
Estimated Average and Peak Water Demand for Project

Water Use	Annualized Average Rate (gpm) (1)	Estimated Peak Rate (gpm) (2)	Estimated Annual Use (acre-feet)
Plant Operation			
125 MW Plant	500	2,013	802
125 MW Plant	500	2,013	802
Total Project	1,000	4,026	1,605

1) – The estimated groundwater usage in gallons per minute is based on an average daily consumption.
2) The peak rate is the instantaneous maximum for summer usage.

Usage rates will vary during the year and will be higher in the summer months when the peak maximum daytime usage rate could be as high as about 2,013 gpm for each 125 MW power plant, or about 4,026 gpm for the Project. However, assuming that the makeup operates at a constant flow rate throughout the night and day, then the makeup flow rate can be averaged. **Soil and Water Table 2** represents the average makeup flow rate (gpm) by month as well as the acre-feet per month for the total Project.

Soil and Water Table 2
Makeup Water Flow Rates for Total Project

Flow	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
gpm (average)	360	404	982	1,192	1,640	1,814	1,598	1,436	1,126	852	426	322
Acre-Feet	49.2	49.8	134.4	157.8	224	240	220	196.4	149.2	116.6	56.4	44.2

Source: Derived from WPAR, 2009.

C.9.4.1 SETTING AND EXISTING CONDITIONS

The Project is located between the communities of Blythe, California (approximately 25 miles east) and Desert Center, California (approximately 27 miles west) and is presented in **Soil and Water Figure 1**.

The Project site is located in the Mojave Desert Geomorphic Province. The Mojave Desert is a broad interior region of isolated mountain ranges separated by expanses of

desert plains. It has an interior enclosed drainage and many playas. There are two important fault trends that control topography—a prominent NW-SE trend and a secondary east-west trend (apparent alignment with Transverse Ranges is significant). The Mojave province is wedged in a sharp angle between the Garlock Fault (southern boundary Sierra Nevada) and the San Andreas Fault, where it bends east from its northwest trend. The northern boundary of the Mojave is separated from the prominent Basin and Range by the eastern extension of the Garlock Fault.

Physiography

The Project Site lies on a broad, relatively flat, southward sloping surface dominantly underlain by alluvial deposits derived from the Palen Mountains to the north and the McCoy Mountains to the east. The alluvial deposits have created two distinct landform types and several discernable landform ages. The deposits immediately adjacent to the mountains have formed alluvial fans from multiple identifiable sources, and multiple fan surfaces have coalesced into a single bajada surface that wraps around each of these mountain fronts. Between the bajada surfaces from each mountain chain is a broad valley-axial drainage that extends southward between the mountains and drains to the Ford Dry Lake playa, located about 1 mile south of the Site (WPAR, 2009).

The elevation of Chuckwalla Valley ranges from under 400 feet at Ford Dry Lake to approximately 1,800 feet above mean sea level (msl) west of Desert Center and along the upper portions of the alluvial fans that ring the valley flanks. The surrounding mountains rise to approximately 3,000 and 5,000 feet msl.

The Site itself is relatively flat and generally slopes from north to south with elevations of approximately 400 to 370 feet msl. It is occupied by a community of low creosote and bursage scrub vegetation.

Climate and Precipitation

The climate in the Chuckwalla Valley, which is classified as a “low desert,” is characterized by high aridity and low precipitation. The region experiences a wide variation in temperature, with very hot summer months with an average maximum temperature of 108 ºF in July and cold dry winters with an average minimum temperature of 66.7 ºF in December. The Blythe area receives an average of approximately 3.5 inches of rainfall per year. The majority of the rainfall occurs during the winter months, but rainfall during the late summer is not uncommon. The summer rainfall events tend to be a result of tropical storms that have a short duration and a higher intensity than the winter rains. Annual precipitation ranges from 0.02 to 0.47 inches per month for a total average annual precipitation of just under four inches per year. **Soil and Water Table 3** and **Soil and Water Table 4** display the average monthly and annual minimum and maximum temperatures and precipitation (rainfall) from 1913 to 2008 collected from the Blythe Airport, located approximately 35 miles southeast of the Project site.

Soil and Water Table 3
Climate Temperature Data for Blythe Airport, California

Month	Temperatures °F					Mean Number of Days			
	Monthly Averages			Record Extremes		Max. Temp.		Min. Temp.	
	Daily Max.	Daily Min.	Monthly	Record High	Record Low	90°F & Above	32°F & Below	32°F & Below	0°F & Below
Jan	66.7	41.5	54.1	89	20	0	0	2.7	0
Feb	72	45.4	58.7	93	22	0.2	0	0.8	0
Mar	78.4	50.2	64.3	100	30	3.1	0	0.1	0
Apr	86.4	56.5	71.5	107	38	11.6	0	0	0
May	95.2	64.4	79.8	114	43	23.8	0	0	0
Jun	104.5	72.7	88.6	123	46	29	0	0	0
Jul	108.4	81	94.7	123	62	30.9	0	0	0
Aug	106.6	80.2	93.4	120	62	30.6	0	0	0
Sep	101.3	73	87.2	121	51	28.4	0	0	0
Oct	89.8	60.9	75.3	111	27	17.6	0	0	0
Nov	75.8	48.6	62.2	95	27	0.8	0	0.1	0
Dec	66.7	41.2	53.9	87	24	0	0	1.8	0
Year	87.7	59.6	73.6	123	20	175.9	0	5.5	0

Source: Western Regional Climate Center (WRCC) 2009.

Soil and Water Table 4
Precipitation Data for Blythe Airport, California

Month	Rainfall (inches) [1913-2008]			
	Mean	Highest Month	Lowest Month	Highest Daily
Jan	0.47	2.48	0	1.64
Feb	0.44	3.03	0	1.66
Mar	0.36	2.15	0	1.52
Apr	0.16	3	0	2.67
May	0.02	0.22	0	0.22
Jun	0.02	0.91	0	0.91
Jul	0.24	2.44	0	1.4
Aug	0.64	5.92	0	3
Sep	0.37	2.14	0	1.9
Oct	0.27	1.89	0	1.61
Nov	0.2	1.84	0	1.04
Dec	0.39	3.33	0	1.42
Year (1)	3.59	---	---	3

Notes: (1) Totals may not match the data in specific columns due to rounding errors.
Source: WRCC, 2009.

Monthly evapotranspiration rates average from 1.5 inches/month during the winter months to over 9 inches per month in the summer. Total yearly average evapotranspiration rates range from 60 to 70 inches/year. **Soil and Water Table 5** presents average monthly evapotranspiration rates for various stations located in the region.

Soil and Water Table 5
Monthly Average Evapotranspiration (ETo) Rates

Month	CIMIS Station #127	CIMIS Station #128	CIMIS Station #135	CIMIS Station #151	CIMIS Station #162	CIMIS Station #175	Regional
	Station: Salton Sea West	Station: Salton Sea East	Station: Blythe NE	Station: Ripley	Station: Indio	Station: Palo Verde II	
Jan (in/mo)	2.40	2.40	2.32	2.44	2.44	2.41	1.55
Feb (in/mo)	3.20	3.20	3.09	3.31	3.31	3.23	2.52
Mar (in/mo)	5.13	5.13	5.00	5.25	5.25	5.59	4.03
Apr (in/mo)	6.78	6.78	6.61	6.85	6.85	7.22	5.70
May (in/mo)	8.62	8.62	8.54	8.67	8.67	8.78	7.75
Jun (in/mo)	9.18	9.18	9.69	9.57	9.57	9.42	8.70
Jul (in/mo)	9.19	9.19	10.13	9.64	9.64	9.58	9.30
Aug (in/mo)	8.63	8.63	8.91	8.67	8.67	8.61	8.37
Sep (in/mo)	6.97	6.97	6.85	6.85	6.85	6.58	6.30
Oct (in/mo)	5.22	5.22	4.64	5.00	5.00	4.74	4.34
Nov (in/mo)	3.08	3.08	2.95	2.95	2.95	2.94	2.40
Dec (in/mo)	2.25	2.25	2.07	2.20	2.20	2.25	1.55
Year (in/yr)	70.65	70.65	70.8	71.4	71.4	71.35	62.50

Notes: Regional evapotranspiration values correspond to CIMIS Reference ETo Zone 16, which includes Westside of San Joaquin Valley and Mountains East & West of Imperial Valley.
Source: Solar Millennium2010a and CIMIS, 2010.

Soils

The USDA soil survey classified the soil on site as typical durorthids, loamy-skeletal, mixed, hyperthermic, and shallow (Cherioni series), and typical torripsamments, mixed, hyperthermic (Rositas series). The following are descriptions of the two main soil series at the Project site (GSEP, 2009a)

Cherioni Series

The Cherioni series consists of very shallow and somewhat excessively drained soils that formed in slope alluvium on volcanic bedrock. Cherioni soils are on fan terraces or hills and have slopes of 0 to 70 percent. Cherioni soils somewhat excessively drained; have medium to rapid runoff; and moderate permeability. The soils are often used for livestock grazing. Vegetation commonly found associated with these soils includes creosotebush, paloverde, saguaro, cholla, ocotillo, triangleleaf bursage, and ratany (GSEP, 2009a).

Rositas Series

The Rositas series consists of very deep, somewhat excessively drained soils formed in sandy eolian material. Rositas soils are on dunes and sand sheets. Slopes range from 0 to 30 percent with hummocky or dune micro relief. Mean annual precipitation is about four inches and the mean annual air temperature is about 72 ºF. The soils are reported to be somewhat excessively drained; have negligible to low runoff; and rapid permeability (GSEP, 2009a). Rositas soils are used for rangeland and wildlife habitat. Present vegetation is creosotebush, white bursage, desert buckwheat, and mesquite.

Soil and Water Figure 2 shows the soils present at the Project site using the NRCS.

Geology

The Project site is situated within the central portion of Chuckwalla Valley, an east-southeast trending valley in California's Mojave Desert Geomorphic Province. The Mojave Desert Geomorphic Province is a wedge-shaped interior region separated from the Sierra Nevada and Basin and Range Provinces to the northwest by the Garlock Fault and its eastward extensions, and is bounded to the southwest by the Transverse Range and Colorado Desert Provinces, the San Andreas Fault, and its southern extensions. The Mojave Desert Geomorphic Province is characterized by northwest-southeast as well as east-west trending structures and mountain ranges, separated by desert valleys and plains with many enclosed drainages and playas.

Regional & Local Geology

The region has a complex geologic history that includes sedimentation, volcanic activity, folding, faulting, uplift, and erosion. The project area is underlain by Holocene to Miocene basin fill deposits (Stone, 2006). These deposits include younger alluvium, older (Pleistocene) alluvium, the Pliocene Bouse Formation, and the Miocene Fanglomerate. The uppermost alluvium in the basin consists of Holocene to Pleistocene alluvial fan, valley axial (fluvial), playa (dry lake), and Aeolian (wind blown) deposits. **Soil and Water Figure 3** presents the surficial geology of the Project site.

Quaternary Alluvium

Quaternary alluvial fill in the basin consists of Holocene to Pleistocene alluvial fan and valley axial (fluvial or stream) deposits, as well as lacustrine (lake) and playa (ephemeral lake) deposits (CDWR, 2004). These deposits consist of gravel, sand, silt, and clay (CDWR, 1963). In general, coarser alluvial fan deposits are expected near the valley edges and grade into finer distal fan deposits that interfinger with fine-grained lacustrine and playa deposits near the center of the basin. These deposits are typically heterogeneous. Valley axial drainages tend to be more uniform and continuous, and contain a greater proportion of sand and fine gravel. Portions of the basin are also occupied by aeolian (wind blown) sand deposits, but the identified aeolian deposits occur at the ground surface and are of limited thickness. The Quaternary sediments include the Pleistocene-age Pinto Formation, which consists of coarse fanglomerate (cemented, consolidated, or semiconsolidated alluvial fan gravels) containing boulders and lacustrine clay with some interbedded basalt (CDWR, 2004).

Pliocene Bouse Formation

The Pliocene Bouse Formation underlies the Quaternary sediments. The Bouse Formation includes a marine to brackish-water estuarine sequence deposited in an arm of the proto-Gulf of California (Stone, 2006; Wilson and Owen-Joyce, 1994). This formation has alternatively been interpreted as, or may include, lacustrine sediments deposited in a closed, brackish basin (Stone, 2006). The Bouse Formation is widely reported in the Colorado Valley and tributary basins in southeastern California and descriptions of this formation come from occurrences outside of Chuckwalla Valley. It is reported to be composed of a basal limestone (marl) overlain by interbedded clay, silt, sand, and tufa. The top of the Bouse Formation is relatively flat-lying with a reported dip of approximately 2 degrees south of Cibola (Metzger and others, 1973).

Miocene Fanglomerate

The Bouse Formation is unconformably underlain by a fanglomerate composed chiefly of angular to subrounded and poorly sorted partially to fully cemented pebbles with a sandy matrix (Metzger and others, 1973). The Fanglomerate is likely Miocene-age; however, it may in part be Pliocene-age (Metzger and others, 1973). The Fanglomerate represents composite alluvial fans built from the mountains towards the valley and the debris of the Fanglomerate likely represents a stage in the wearing-down of the mountains following the pronounced structural activity that produced the basin and range topography in the area (Metzger and others, 1973). Bedding surfaces generally dip from the mountains towards the basin. The Fanglomerate reportedly dips between 2 and 17 degrees near the mountains due to structural warping (Metzger and others, 1973). The amount of tilting indicates a general decrease in structural movements since its deposition (Metzger and others, 1973).

Bedrock

Bedrock beneath the Project site consists of metamorphic and igneous intrusive rocks of pre-Tertiary age that form the basement complex (CDWR, 1963), including Proterozoic schist and gneiss, Paleozoic sedimentary rocks, and Mesozoic sedimentary and metavolcanic rock sequences (Stone, 2006). In some areas of the Chuckwalla Valley, volcanic rocks of Tertiary age overlie the basement complex (CDWR, 1963). The bedrock topography in the study area, as interpreted by modeling of Bouger gravity data obtained from USGS and interpreted by Worley-Parsons (2009b), is illustrated in **Soil and Water Figure 4**.

Mapped Geologic Units at the Project Site

The Project site lies on a broad, relatively flat, sloping surface underlain by alluvial deposits derived from the Palen Mountains to the north and the McCoy Mountains to the east. These alluvial deposits have created two distinct landform types and several discernable landform ages. The deposits immediately adjacent to the mountains have formed alluvial fans from multiple identifiable sources, and multiple fan surfaces have coalesced into a single bajada surface that wraps around each of these mountain fronts. Between the bajada surfaces from each mountain chain is a broad valley axial drainage that extends southward between the mountains and drains to the Ford Dry Lake playa, located about 1 mile south of the Project site. The Project site itself is relatively flat and generally slopes from north to south with elevations of approximately 400 to 370 feet msl. It is occupied by a community of low creosote and bursage scrub vegetation.

Three lines of evidence have been used to describe the shallow geological conditions underlying the Project site. First, geophysical investigations conducted at the Project site indicate the electrical conductivity of the underlying sediments (an indicator of the amount of fine-grained sediment and salinity of the groundwater) is consistent and similar across the Project site area. Second, seismic refraction profiling suggests the shallow alluvium has similar properties across the Project site. Third, site-specific subsurface investigations demonstrated the Project site is underlain by alluvium consisting of interbedded and intermixed dense sand and gravel, and hard silt and clay to a depth of approximately 245 to 275 feet below ground surface (bgs), which is approximately 125 feet msl. These sediments are heterogeneous both laterally and vertically, although the valley axial alluvium beneath the eastern portion of the Project

site may contain cleaner sands than sediments underlying the bajada surfaces, and laterally may be more homogenous.

Groundwater occurs within the shallow alluvium at a depth of approximately 70 to 90 feet bgs. Beneath the alluvium, the Pliocene Bouse Formation is estimated to extend to approximately 2,000 feet bgs (approximately -1,500 feet msl), and is generally richer in fine-grained sediments than the overlying alluvium. The Miocene fanglomerate is inferred to underlie the alluvium at this depth and is estimated to extend to approximately 2,900 feet bgs (-2,400 feet msl).

A map presenting the surficial geology in the Project site area is presented as **Soil and Water Figure 5**. In developing this map, alluvial sediment units established by the USGS (Stone, 2006) have been adopted, with modifications, as summarized in **Soil and Water Table 6**, and described in greater detail below.

Soil and Water Table 6
Mapped Surficial Geologic Units

Map Unit	Inferred Age	Descriptive Name
Qyva	Post-Holocene	Younger Valley Axial Alluvial Deposits
Qyma	Post-Holocene	Younger Mixed Alluvial and Aeolian Deposits
Qyaf	Late Holocene	Younger Alluvial Fan Deposits
Qiaf	Mid-Holocene	Intermediate Alluvial Fan Deposits
Qoaf	Late Pleistocene	Older Alluvial Fan Deposits

Younger Valley Axial Alluvial Deposits (*Qyva*). Alluvial deposits in the valley axial drainage that underlie the majority of the eastern part of the Project site are characterized by a north-south trending fabric aerial photographs and possess a generally subdued bar and swale topography at ground level. These deposits represent the distal end of a northeast to southwest-trending valley axial drainage which lies between the Palen and McCoy Mountains and terminates at Ford Dry Lake. Very few small washes are continuous across the eastern part of the Project site.

The valley axial deposit surfaces display local incipient desert pavement development, and no carbonate accumulation in the soil. Surface morphology is a subdued bar and swale morphology generally lacking water erosional features and indicative of a depositional surface. Evidence of competing wind erosion, including lag deposits and small mounds next to bushes, was also noted; however, the dominant processes appear to be alluvial. The morphology and lack of soil development are consistent with depositional surfaces that are at most a few hundred years old, and suggest a prograding alluvial apron.

Subsurface stratification observed in the top 12 to 18 inches of these deposits consists of silty sand deposits in the downslope portions of the Project site, which is consistent with the formation of silt crusts after sheet floods. Also observed were cross-bedded silty sand beds about 8 to 10 cm thick and massive silty sand with gravel just upslope of the Project site. The recurrence interval of floods leaving these deposits is not known. Floods reaching Ford Dry Lake and filling the lakebed are reported to occur about once every 10 years. If each of these beds represents 10 years of accumulation, they would be indicative of deposition rates of 1 meter (m)/1,000 years in the downslope portions of

the Project site and up to 10 times that in the upslope portions of the Project site. However, beneath the upslope portions of the Project site that are closer to the fan intersection points, the locus of deposition would be more likely to change from one flood event to the next, so the deposition rates are probably less.

Younger Mixed Alluvial and Aeolian Deposits (*Qyma*). Between the Project site and Ford Dry Lake, the alluvial fan and valley axial alluvium deposits described above grade into a mixture of deposits consisting of distal alluvial deposits, sand and silt sheet flood deposits, and interspersed aeolian sand sheets and local small coppice dunes. These deposits are generally located south of the Project site boundaries, but underlie much of the alignment of the off-site linears associated with the Project.

Younger Alluvial Fan Deposits (*Qyaf*). Similar to the Palen Mountains, the downslope extent of the Pleistocene-age, relict alluvial fan surfaces at the foot of the McCoy Mountains appear to mark the same type of intersection point on the fans in this area. However, the aerial photographs of this area suggest the bajada surface downslope of the McCoy Mountains has a more pronounced bar and swale topography, is generally lighter in color, and has more developed (or preserved) distributary channel development extending to the lower reaches of this surface. In addition, the presumed ancient shoreline feature that trends across the Qiaf surfaces downslope of the Palen Mountains (see description below) is not discernible across these fans, and appears to have been covered by deposition during the late Holocene. The Qyaf deposits consist of silty sands and gravelly silty sands, with generally finer-grained gravel than the upslope deposits.

Intermediate Alluvial Fan Deposits (*Qiaf*). The downslope extent of the Pleistocene terraces at the foot of the Palen Mountains marks the “intersection point” of the fans in this area. Downslope of these points, the incised (and confined) washes emerge from an erosional setting and transition into a depositional mode with fan lobes, subdued bar and swale topography, and shallow distributary washes, all of which are consistent with a distal fan environment. These lower fan deposits exhibit a darker color than the adjacent valley axial (Qyva), aeolian (Qyma), or playa (not mapped) deposits.

Desert pavement is present, but its development is not as extensive, and the individual clasts that comprise the pavement do not exhibit the same degree of desert varnish development as the upslope, and older, alluvial fan surfaces. The intermediate fan deposits consist of silty sands and gravelly silty sands, with generally finer-grained gravel than the upslope deposits.

A linear feature visible on an aerial photograph is discernible in **Soil and Water Figure 5** (marked as Ancient Shoreline) based on a change from a rougher, lighter-colored and more dissected surface (on its north side) to a darker, smoother surface (on its south side). This lineament extends across the bajada surface in an east-west direction approximately along the 400 foot msl elevation contour. The photo lineament disappears in the lighter-colored valley axial deposits that underlie the majority of the eastern portion of the Project site. To the west of the Project site, where the 400 foot contour trends southward across the valley floor, the lineament also disappears. However, similar features can be observed at approximately the same elevation on the

south side of Chuckwalla Valley (*i.e.,* south of I-10), and on the south flank of the McCoy Mountains (north of I-10).

A plausible explanation for this feature consistent with the above observations is the preservation of an ancient shoreline developed during a pluvial lake highstand of Ford Dry Lake. The potential validity of this interpretation will be further investigated during future reconnaissance and reported to Energy Commission. Shoreline features related to pluvial lake highstands are widely reported elsewhere in the southwestern United States, where they record the influence of wetter climates during the last glacial Maximum of the latest Pleistocene (approximately 17,000 to 10,000 years before present [BP]), as well as Holocene glacial oscillations approximately 8,300 years BP (early Holocene), 6,400 years BP (mid-Holocene), and 4,000 years BP (early Neoglacial) (Castiglia and Fawcett, 2006; Enzel et al., 1989; Briggs, 2003; and Wells, McFadden and Dohrenwend, 1986). More recent standing lakes were reported for short periods in some arid basins in the Mojave Desert during cooler, wetter intervals approximately 200 and 600 years BP, and during particularly wet periods in recorded history, such as 1916 to 1917, 1938 to 1939, and 1969. Based on the moderate degree of desert pavement development on these fan surfaces and slight to moderate desert varnish development on the pebble surfaces, it is estimated the lake highstand theorized to be responsible for this relict shoreline feature would have occurred during the mid-Holocene, at least 4,000 years ago (Elvidge and Iverson, 1983).

If the presumed ancient shoreline can be verified, this would suggest the intermediate alluvial fan deposit surfaces at the Project site have been in a state of relative equilibrium (undergoing little erosion or sedimentation) for the last 4,000 years.

Older Alluvial Fan Deposits (*Qoaf*). The upper and middle alluvial fan surfaces, located north of, and upslope from, the western portion of the Project site, consist of coarse to medium grained sandy gravels and gravelly sands and are extensively dissected by deep washes that are up to 1/4 mile wide and over 50 feet deep in the proximal fan areas. Between these incised washes, the remnant alluvial fan surfaces are covered by well-developed desert pavement with nearly 100 percent stone cover, dark brown to nearly black desert varnish, and carbonate deposition on the lower sides of the clasts. The desert pavement development is consistent with a Pleistocene surface age and these remnant fan surfaces were mapped as late Pleistocene by Stone (2006). These remnant fan surfaces extend largely unbroken (between the incised washes) into the upslope portions of the western parcel of the Project site and northwestern-most corner of the eastern parcel.

Regional Tectonic Setting

The Mojave Desert comprises an area bounded by the seismically active Salton Trough to the west and southwest, and the Garlock Fault to the north. To the east and southeast it is bounded by the Sonoran Desert subprovince, a relatively stable tectonic region located in southeastern California, southwestern Arizona, southern Nevada, and northern Mexico (Balderman, et al., 1978). Chuckwalla Valley is located in the eastern Mojave Desert province in an area that is relatively stable tectonically. Faults in the area occur primarily in Tertiary and pre-Tertiary strata and are related to compressional tectonism along a convergent Andean and island arc margin in the Mesozoic, and

extensional detachment and block faulting during Tertiary time. No faults of Quaternary age are known to exist near the Project site.

Local Faulting

The Project site lies within the eastern part of Riverside County in a part of California considered to be not very seismically active. Although there are several bedrock faults off-site in the mountains surrounding Chuckwalla Valley, these do not exhibit recent activity and are presumed to be Tertiary or pre-Tertiary in age (Stone, 2006). In addition, gravity anomalies suggest the presence of several subsurface faults beneath Chuckwalla Valley in the vicinity of the project area (Stone, 2006; Rotstein, et al., 1976). The gravity anomalies reflect abrupt changes in basement elevation strongly suggestive of dip-slip movements. In addition, some of these faults may have undergone right-lateral strike slip movements. These faults are presumed Tertiary and likely inactive with very low chance of earthquakes.

Geomorphology

The Project Site lies on a broad, relatively flat, southward sloping surface dominantly underlain by alluvial deposits derived from the Palen Mountains to the north and the McCoy Mountains to the east. The alluvial deposits have created two distinct landform types and several discernable landform ages. The deposits immediately adjacent to the mountains have formed alluvial fans from multiple identifiable sources, and multiple fan surfaces have coalesced into a single bajada surface that wraps around each of these mountain fronts. Between the bajada surfaces from each mountain chain is a broad valley-axial drainage that extends southward between the mountains and drains to the Ford Dry Lake playa, located about 1 mile south of the Site. The Site itself is relatively flat and generally slopes from north to south with elevations of approximately 400 to 370 feet msl (WPAR, 2010).

The ground surface in this area slopes very gently to the southwest, toward Ford Dry Lake, at inclinations of approximately one-half percent. Landforms include alluvial and sand plains, local coppice dunes, and local subdued bar and swale topography associated with sheet flood deposits. East of Ford Dry Lake, the off-site linears cross the distal portions of a valley axial drainage that enters Ford Dry Lake from the east. The ground surface in this area slopes westward at less than one-half percent and the alluvial and the aeolian plain in this area includes similar landforms as described above (WPAR, 2010).

The proposed development exists within the Mojave Desert Geomorphic Province. Geomorphic provinces are naturally defined geologic areas with a distinct landscape or landform resulting primarily from their predominant underlying geologic structure. The southeast portion of this province, where the Project site is located, is physiographically part of the Sonoran Desert, which includes the lower Colorado River region of southeastern California and extends into southern Arizona. The Mojave Desert Geomorphic Province exists within the larger Basin and Range Geomorphic Province (BRGP), with which it shares a strikingly similar geologic history and resulting geomorphology. For the purposes of this site evaluation, the use of the term BRGP will include the Mojave Desert Geomorphic Province. The geomorphology of the BRGP is dominated by mountains and valleys produced during dramatic tectonic extension in the

western and southwestern United States primarily during the mid to late Tertiary (Nelson, 1981; Armstrong, 1982; Rehrig, 1982; Hamilton, 1982; Anderson, 1988; Wernicke, 1992).

The Project site exists within the distal fan portion of a series of alluvial fans and bajadas flanking the east side of the Palen Mountains to the north and northwest of the Project site, and the southwestern side of the McCoy Mountains to the northeast (Plate 1). The piedmont bajadas merge within an approximately northward trending axial valley between the Palen and McCoy Mountains (referred to herein as the Palen-McCoy Valley) that terminates in Ford Dry Lake. Topographically, the area of the proposed Project solar array and linear facilities are relatively flat, with an approximately 0.3 degree southwest slope and exhibits surficial sediments composed of silty sands with lesser amounts of fine grained gravel. The Project site exhibits relatively thin alluvium, relict dune and current drainage deposits overlying older alluvium across most of the site above an elevation of 377 feet msl (See report in Appendix E). Below an elevation of approximate 377 feet msl, the thin layer of alluvium, relict dune and current drainage deposits overly latest Pleistocene lacustrine deposits.

The aerial extent of aeolian activity is moderately less than during past regional dune aggradational events. This can be seen on **Soil and Water Figure 6**, where unit Qsr (relict dune fields) extends beyond the northern boundary of the primary sand migration corridor from Palen Lake through the Ford Dry Lake area, and south of the Project solar arrays. In addition, considerable near surface Qsr deposits are identified within interdune regions of mapped aeolian sand migration corridors (mapped unit Qsad on **Soil and Water Figure 6**). For the most part, the same sand migration corridors that were active during past dune aggradational events within the Chuckwalla Valley region are still the primary pathways of sand migration.

Active aeolian sand migration in the Project site vicinity occurs within existing sand migration corridors located south of the Project site and linears (the PDL-Chuckwalla Valley Axis Sand Corridor), and east of the Project site and Ford Dry Lake (the Palen-McCoy Valley Sand Corridor). The vast majority of sand moving within the Palen-McCoy Valley Sand Corridor passes east of the proposed solar array, and a relatively minor component migrates within the easternmost portion of the proposed solar array (see WPAR, 2010 - Plate 14 — Photos A, B, and C).

The aeolian sand migration within the eastern-most area of the proposed Project solar array has two sources. These include sand derived from the local small ephemeral washes within the footprint of the proposed facility soon after they flow, and from southward migrating sand moving down the Palen-McCoy Valley Sand Corridor. Based on field mapping, aerial photograph evaluation and evidence that the onsite drainages flow infrequently (estimated to be approximately every 20 years and likely associated with relatively large El Nino events) the aeolian sand derived from the onsite drainages represents a very small component of the total aeolian sand within the Palen-McCoy Valley Sand Corridor system. In addition, the amount of wind-blown sand passing through the eastern-most portion of the proposed Project solar array represents a very minor component to the total aeolian sand migrating in the Palen-McCoy Valley Sand Corridor. Based on the existing data, it is likely that the component of aeolian sand migrating through, or derived in, the eastern-most portion of the Project solar array site

is less than 5 percent of the total wind blown sand migrating within the Palen-McCoy Valley Sand Corridor system.

Based on the existing data, the following conclusions may be made about the relative contribution of various aeolian sand sources and about sand migration in the region of the Project:

- The majority of the region of the proposed solar arrays is not located within aeolian sand migrating corridors and thus will not block wind blown sand within the Ford Dry Lake dune system.
- The southern and eastern-most regions of the proposed solar arrays are within the outer envelope of an aeolian sand migrating corridor but these regions experience a relatively minor magnitude of wind blown sand migration.
- The washes and surface areas within the proposed solar arrays and linears represent a very minor source of aeolian sand. Thus, proposed grading and development will not remove a significant source of aeolian sand and adversely affect mapped areas of active aeolian deposits.
- The PDL-Chuckwalla Valley Axis Sand Corridor is a major source of wind blown sand for the dune system located south of I-10. Thus, most of the aeolian migrating sand from the Palen Lake-Chuckwalla valley axis does not reach the Project.
- Ford Dry Lake proper is a minor to moderate source of aeolian sand for the region of the Project linears.
- The aeolian sand corridor along the eastern side of the Palen-McCoy Valley (**Soil and Water Figure 6**) is a major aeolian sand source feeding the dune system east of the solar array and linears. Over 95 percent of the migrating aeolian sand in the Palen-McCoy Valley sand corridor migrates east of the proposed Project. Thus, less than 5 percent of the migrating aeolian sand is estimated to be derived from the area within the proposed solar arrays.
- Local washes located along the rim of Ford Dry Lake proper represent a very minor source of aeolian sand to the regions bounding the linears and south of the solar arrays.

Hydrogeology

Groundwater Basins

The site is located within the CVGB (CDWR Basin No. 7-5), which has a surface area of 940 mi^2 (2,435 km^2) underlying Chuckwalla Valley (CDWR, 2004). The CVGB is an unadjudicated groundwater basin and owners of property overlying the basin have the right to pump groundwater from the basin for reasonable and beneficial use, provided that the water rights were never severed or reserved. In addition, groundwater production in the basin is not managed by an entity and no groundwater management plan has been submitted to the California Department of Water Resources.

The site location in the basin is shown on **Soil and Water Figure 7**. The CVGB is bounded by the consolidated rocks of the surrounding mountains. Three water-bearing Quaternary- and Tertiary-age sedimentary units overly non-water bearing bedrock in the

CVGB (CDWR, 2004; DWR, 1963). DWR reports the maximum thickness of these deposits as about 1,200 feet in the CVGB (CDWR 1979); however, modeling of Bouger gravity data obtained from USGS suggest greater depths to bedrock exist in some parts of the basin (See **Soil and Water Figure 4**).

The CVGB is bounded upgradient by two other groundwater basins that include the eastern part of the Orocopia Valley (CDWR Basin No. 7-31) and Pinto Valley (CDWR Basin No. 7-6) groundwater basins and downgradient by the Palo Verde Mesa (CDWR Basin No. 7-5) Groundwater basin. A brief overview of the adjoining basins follows:

Eastern Orocopia Valley (7-31)

This basin underlies Orocopia Valley, northeast of the Salton Sea, in central Riverside County. It is bounded by impermeable rocks of the Cottonwood and Eagle Mountains on the north and of the Orocopia and Chocolate Mountains on the south (see **Soil and Water Figure 7)**. The basin is bounded by a section of the San Andreas fault zone and semi-permeable rocks of the Mecca Hills on the west and by a bedrock constriction on the east. The western portion of the valley drains westward toward the Salton Sea, but the eastern part drains eastward into Hayfield (dry) Lake and Chuckwalla Valley. Average annual precipitation ranges to 4 inches (CDWR, 2003).

Pinto Valley (7-6)

This groundwater basin underlies Pinto Valley in northern Riverside County (see **Soil and Water Figure 7)**. It is bounded by nonwater-bearing rocks of the Coxcomb Mountains on the east and northwest, the Pinto Mountains on the north, of the Eagle Mountains on the south, and the Hexie Mountains on the west (Bishop 1963; Jennings 1967). The valley is drained eastward by the Fried Liver, Smoketree, and Porcupine Washes (Jennings 1967). Average annual precipitation ranges to 6 inches (CDWR, 2003).

Palo Verde Mesa (7-39)

This basin underlies Parker Valley in eastern Riverside County (see **Soil and Water Figure 7)**. The basin is bounded by nonwater-bearing rocks of the Big Maria and Little Maria Mountains on the north, the McCoy and Mule Mountains on the west, the Palo Verde Valley on the east, and of the Palo Verde Mountains on the south (CDWR 1979; Jennings 1967). The northwest boundary and parts of the western boundary are drainage divides (Metzger 1973; Jennings 1967). The valley is drained by McCoy Wash to the Colorado River. Average annual precipitation ranges to 6 inches (CDWR, 2003).

Groundwater Inflow/Outflow

Natural groundwater recharge to the CVGB includes recharge from precipitation and subsurface inflow from the Pinto Valley Groundwater Basin to the northwest and the Orocopia Valley Groundwater Basin to the Southwest (CDWR, 2004; Eagle Crest, 2009). Underflow from the Cadiz Valley Groundwater Basin has also been hypothesized by DWR (2004); however, recent work has reportedly confirmed that the Cadiz Valley Groundwater Basin does not contribute inflow to the CVGB (BV and WCC, 1998). CVGB also shares a boundary with the Ward Valley Groundwater Basin, but groundwater is not reported to flow across this boundary (Bedinger, et al., 1989). Other

sources of recharge to the basin include agricultural return flow and return flow from treated wastewater disposal.

Recharge from Precipitation

In this part of California, almost all moisture from rain is lost through evaporation or evapotranspiration and runoff occurs principally during intense thunderstorms (RWQCB, 2006). Most recharge from precipitation occurs when runoff from the surrounding mountains exits bedrock canyons and flows across the coarse sediments deposited in the proximal portions of the alluvial fans that ring Chuckwalla Valley. To a lesser extent, recharge occurs from infrequent precipitation or runoff on the valley floor (CDWR, 2004). The area of the Chuckwalla Valley watershed encompasses Chuckwalla Valley (601,543 acres) and the surrounding bedrock mountains (258,825 acres), for a total area of approximately 860,368 acres. Available estimates of recharge in CVGB are variable and in some cases based on incomplete or incorrect data. DWR has not published an estimated recharge rate for the basin (CDWR, 2004). In 1986, Woodward Clyde calculated recharge from precipitation for the Chuckwalla Valley watershed to be 29,530 acre feet per year (afy) (Woodward Clyde, 1986). This equates to an average recharge rate of approximately 0.036 feet per year (0.4 inches). Woodward Clyde reported this number as approximately 12.8 percent of an average annual precipitation of 3.39 inches per year across the watershed; however, this was the average annual precipitation in Blythe at the time, and does not consider that the orographic effect of the surrounding mountains which results in precipitation rates of over 6 inches per year in the higher elevation portions of the watershed (Hely and Peck, 1964). In 1992, the average recharge to CVGB was reportedly estimated by BLM and the County of Riverside to be 5,540 to 5,600 afy based upon an assumed 10 percent infiltration of precipitation (Eagle Crest, 2009); however, this number evidently considered only a portion of the watershed as it would equate to an average annual precipitation depth of only about 1 inch per year across the watershed. Recent studies have demonstrated recharge rates for nearby desert basins ranging from approximately 3 to 5 percent of the total incident precipitation on the basin catchment area (Whitt and Jonker, 1998). A review of recharge studies in the arid southwest performed by USGS (2007b) cited a wide range of recharge rates, but rates in similar basins ranged from about 3 to 7 percent.

For this study, recharge from precipitation was estimated by overlaying isohyetal maps prepared by Hely and Peck on the Chuckwalla watershed boundaries and calculating the volume of average annual precipitation for each of four precipitation zones for the valley and bedrock portions of the watershed. Recharge was then estimated as 3, 5 and 7 percent of total incident precipitation and a reasonable lower bound recharge estimate was adopted. The calculated average annual precipitation volume for the CVGB watershed is 286,250 acre feet over an area of 822,259 acres. Recharge for the CVGB is estimated as a fraction of 3, 5 and 7 percent of total incident precipitation is therefore calculated to be 8,588, 14,313 and 20,038 afy, respectively.

An analysis of infiltration and runoff rates for the CVGB is provided in **Soil and Water Table 7.**

Based on the above analysis, approximately 36 percent of precipitation in the watershed falls on the bedrock areas that ring the watershed. This is significant because precipitation that falls on the valley floor is not expected to contribute consistently to recharge. Studies published by USGS report approximately 7 to 8 percent of precipitation falling on bedrock mountains in other arid basins goes to mountain front recharge (USGS, 2007). Accordingly, the 36 percent of the precipitation that falls on the bedrock areas would be equivalent to approximately 3 percent of the total precipitation that falls on the Chuckwalla Valley watershed. In the absence of more detailed study, 3 percent of total precipitation falling on the Chuckwalla Valley watershed (8,588 afy) is used as a reasonable lower bound estimate of recharge to the CVGB.

Subsurface Inflow

Underflow from the Pinto Valley Groundwater Basin has been calculated to be 3,173 afy (GeoPentech, 2003, Eagle Crest Energy Company, 2009). Inflow from the Orocopia Valley Groundwater Basin has been estimated to be 1,700 afy (LCA, 1981). CH2M Hill (1996) estimated the combined subsurface inflow from both basins to be 6,700 afy. However, recent studies by GeoPentech reportedly indicate that subsurface inflow from Orocopia Valley Groundwater Basin may be as low as several hundred afy. Therefore a combined subsurface inflow rate of 3,500 afy was assumed for both basins for water budget purposes.

Wastewater Return Flow

Chuckwalla State Prison was constructed approximately 7 miles southwest of the project site in 1988, and Ironwood State Prison became operational in 1994. The prisons use an unlined pond to dispose of treated wastewater, and a large percentage of this discharge is reported to infiltrate into the subsurface and recharge the CVGB. For the years 1998 through 2001, the California Department of Water Resources-Department of Planning and Local Assistance (CDWR-DPLA) reported that deep percolation of applied urban water in the Chuckwalla Planning Area (assumed to be wastewater return flow) was 500 to 800 afy (CDWR-DPLA, 2007).
According to authorities at the State prison complex (Lanahan, 2009), they indicated that approximately 600 afy of treated effluent recharges the basin. Recently published water budget information for the Eagle Crest Pumped Storage Project (Eagle Crest, 2009), indicates 795 afy of treated effluent are recharged by the prisons. An additional source of wastewater return flow in the basin is approximately 36 afy from the Lake Tamarisk development near Desert Center (Eagle Crest, 2009).

Irrigation Return Flow

The amount of applied irrigation water that returns to recharge a groundwater basin depends on the soil, crop type, amount and method of irrigation, and climatic factors. Woodward Clyde (1986) reported an irrigation efficiency of 60 percent (return flow of 40 percent) for jojoba crops in Chuckwalla Valley. DWR-DPLA reported an irrigation efficiency of 72 percent (return flow of 28 percent) for subtropical crops in the Palen Detailed Analysis Unit (DAU) of the Chuckwalla Planning Area (CDWR-DPLA, 2007). In its water budget calculations for the Chuckwalla Planning Area in support of California Water Plan updates, DWR-DPLA calculated an irrigation return flow of approximately 9 to 11 percent for 1998, 2000 and 2001, respectively. A 10 percent return flow is a reasonable factor for deep percolation from irrigation in the basin, and was applied to

the assumed agricultural and landscape water demand in the basin for the purposes of a water budget. Current pumpage associated with activities associated with irrigation return flow is estimated to be approximately 7,700 afy in the CVGB that includes 6,400 afy for agriculture, 215 afy for aquaculture pumping, and 1,090 afy for Tamarisk Lake (Worley-Parsons (2010). Return flows are calculated using the 10 percent or approximately 800 afy and included in Soil and Water Table-6.

Groundwater Demand/Outflow

Groundwater provides the only available water resource in Chuckwalla Valley. Designated and potential beneficial uses of groundwater in the basin include domestic, municipal, agricultural and industrial use (RWQCB, 2006). As such, groundwater demand is a significant contributor to basin outflow. Other sources of basin outflow include subsurface discharge to the Palo Verde Mesa Groundwater Basin, and evapotranspiration at Palen Lake.

Groundwater Demand

Current and historical groundwater pumpage in CVGB includes agricultural water demand, pumping for Chuckwalla and Ironwood State Prisons, pumping for the Tamarisk Lake development and golf course, domestic pumping, and a minor amount of pumping by Southern California Gas Company. In addition, historical pumpage included water supply for the Kaiser Corporation Eagle Mountain Mine. With the exception of pumping for Chuckwalla Valley and Ironwood State Prisons, most of the current groundwater pumping in the basin occurs in the western portion of the basin, near the town of Desert Center. Current pumpage is estimated to be approximately 7,756 afy in the western CVGB and 2,605 afy in the eastern basin WPAR, 2010 – Table 3-4). Agricultural production is limited to the western portion of the basin (Eagle Crest, 2009; DWR-DPLA, 2007 and 2009), with the exception of a relatively limited amount of acreage that is associated with the state prisons.

Subsurface Outflow

Subsurface outflow to Palo Verde Mesa Groundwater Basin was estimated by Metzger (1973) to be 400 afy. This calculation was based on a cross sectional profile of the boundary between the two basins derived using geophysical methods and regional data regarding groundwater gradients and hydraulic conductivity. Woodward Clyde (1986) revised this estimate based on the results of pump testing at Chuckwalla State Prison and calculated the basin outflow to be 870 afy. Engineering Science (1990) updated this estimate to 1,162 afy, presumably as a result of return flow from prison wastewater disposal; however, the rationale for this adjustment was not provided. Using more recent gravity data, Wilson and Owens-Joyce (1994) found that the area through which discharge occurs is significantly more limited than previously thought due to the presence of a buried bedrock ridge. As a result, the most recent available water budget for the basin has adopted an outflow rate of 400 afy (Eagle Crest, 2009). For purposes of this analysis, staff has adopted the 400 afy as being representative of subsurface outflow from the CVGB.

Soil and Water Table 7
Estimated Runoff and Infiltration in Chuckwalla Valley Groundwater Basin

Layer (1)	Area (acres)	Mean Annual Precipitation (inches) (2)	Total Volume of Rainwater from Mean Annual Precipitation (AF)	Runoff Curve Classification (2)	Runoff Curve Number (2)	Runoff (percent of Precipitation)	Total Annual Volume of Infiltration – Hely & Peck (AF)	Total Annual Volume of Infiltration (AF) based on 3percent (3)	Total Annual Volume of Infiltration (AF) based on 5percent (3)	Total Annual Volume of Infiltration (AF) based on 7percent (3)
unit1-cw	30,303	5	12,626	Alluvium, Steep Slope	74	3.50percent	442	379	631	884
	211,498	4	70,499	Alluvium, Flat Slope	69	2.00 percent	1,410	2,115	3,525	4,935
	41,073	3.5	11,980	Alluvium, Steep Slope	74	3.50 percent	419	359	599	839
	12,077	4	4,026	Alluvium, Steep Slope	74	3.50 percent	141	121	201	282
	910	4	303	Alluvium, Steep Slope	74	3.50 percent	11	9	15	21
	194	4	65	Alluvium, Steep Slope	74	3.50 percent	2	2	3	5
	81,233	5	33,847	Alluvium, Steep Slope	74	3.50 percent	1,185	1,015	1,692	2,369
bedrockchuckwalla	32,001	5	13,334	Mountains	93	29.10 percent	3,880	400	667	933
	21,456	5	8,940	Mountains	93	29.10 percent	2,602	268	447	626
	11,050	5	4,604	Mountains	93	29.10 percent	1,340	138	230	322
	109	5	46	Mountains	93	29.10 percent	13	1	2	3
	9,246	4	3,082	Mountains	93	29.10 percent	897	92	154	216
	10,042	4	3,347	Mountains	93	29.10 percent	974	100	167	234
	282	4	94	Mountains	93	29.10 percent	27	3	5	7
	3,480	4	1,160	Mountains	93	29.10 percent	338	35	58	81
	275	4	92	Mountains	93	29.10 percent	27	3	5	6
	90	4	30	Mountains	93	29.10 percent	9	1	2	2
	398	4	133	Mountains	93	29.10 percent	39	4	7	9
	316	4	105	Mountains	93	29.10 percent	31	3	5	7
	39,340	5	16,392	Mountains	93	29.10 percent	4,770	492	820	1,147
	194	5	81	Mountains	93	29.10 percent	24	2	4	6
unit3-cw	28,973	3	7,243	Alluvium, Flat Slope	69	2.00 percent	145	217	362	507
unit2-cw	198,558	3	49,640	Alluvium, Steep Slope	74	3.50 percent	1,737	1,489	2,482	3,475
bedrockchuckwalla	89,161	6	44,581	Mountains	93	29.10 percent	12,973	1,337	2,229	3,121
TOTALS	**822,259**	**---**	**286,250**		**---**	**---**	**33,436**	**8,588**	**14,313**	**20,038**

Notes:
(1) See Figure DR-S&W-179-1 in Solar Millennium, 2010a.
(2) From Hely & Peck, 1964.
(3) Based on a percent of Total Volume of Rainwater from Mean Annual Precipitation (Column 4).

Source: Derived from Solar Millennium 2010a.

Palen Lake Evapotranspiration

Regional groundwater flow and discharge mapping performed by USGS (Bedinger, et al., 1989) did not identify Palen Lake as an area where groundwater discharges at the ground surface. Nevertheless, groundwater elevation contour mapping suggests that

groundwater may occur near the ground surface beneath approximately the northwestern 25 percent of Palen Lake. It is therefore possible that a portion of Palen Lake is operating as a wet playa. Groundwater levels beneath the southeastern portions of Palen Lake, and a small ancillary playa located approximately one mile southeast of Palen Lake, were reported by Steinemann (1979) as being 20 to 30 feet below ground level, suggesting that Palen Lake would be a dry playa at various times.

Review of aerial photography indicates what appears to be a relatively small area of dissected salt pan near the northern and western sides of the playa. Because the salt pan is dissected, it is not clear whether salt deposition is actively occurring or whether this material is residual deposition from surface water evaporation. Immediately northwest of Palen Lake, between Palen Lake and Desert Center-Rice Road, Pleistocene lake bed deposits crop out at the ground surface in the form of dissected, mesa-like prominences that are 5 to 10 feet high (CDWR, 1963). These deposits are capped with a layer of caliche and locally support scattered mesquite trees. There does not appear to be any other evidence of shallow groundwater or evapotranspiration visible in aerial photography.

Groundwater elevation contour mapping (Steinemann, 1989) suggests that groundwater may occur near the ground surface beneath approximately the northwestern 25 percent of Palen Lake. A well located approximately two miles north of Palen Lake is reported to be completed to a depth of 501 feet below the ground surface and has a ground surface elevation of 500 feet msl (WPAR, 2009a). A screened interval for the well is not reported. Groundwater levels in this well were reported to be approximately 20 to 25 feet below the ground surface (bgs) between 1932 and 1984. Given that the surface elevation at Palen Lake two miles to the south is approximately 460 feet msl, or 40 feet lower, it appears possible that groundwater levels are very close to the ground surface beneath the northern portion of the playa. In addition, DWR (1963) identified the presence of mesquite trees on low mesa-like promontories of Pleistocene lacustrine sediments at the northwest margin of Palen Lake playa, also suggesting the possible presence of relatively shallow groundwater. These data suggest it is possible that an area in the northern portion of Palen Lake is discharging groundwater by evaporation as a wet playa. Groundwater levels beneath the southeastern portions of Palen Lake, and a small ancillary playa located approximately one mile southeast of Palen Lake, are 20 to 30 feet below ground level (Steinemann, 1989), indicating these are dry playa areas.

Review of aerial photography indicates an approximately 700-acre area of dissected salt pan in the northwest portion of the playa (Worley-Parsons, 2010). This feature is surrounded by an additional approximately 1,300 acres that show evidence of more limited surface salt accumulation. The extent of this area is visible in aerial imagery from November 2005, and was generally confirmed by a reconnaissance performed on December 10 and 30, 2009. Review of the historical progression aerial imagery (Worley-Parsons 2010**)** indicates no or limited salt accumulation in this area from 1996 through 2002, light salt accumulation in March of 2005, and the currently observed salt pan area in November 2005. This suggests that salt pan accumulation in the playa is episodic; however, seasonal, intermittent accumulation cannot be ruled out. Historical precipitation records indicate that 2005 rainfall in Blythe was approximately twice the long term annual average, with 5.10 inches occurring in January and February 2005 (WRCC, 2009), just before the March 2005 aerial photograph was taken. These storm

events would be expected to have resulted in the accumulation of runoff in Palen Lake, and consequently in dissolution and re-crystallization of salt deposits during evaporation of surface water, and by wetting and subsequent drying of salt containing playa sediments. As such, these rainfall events are likely responsible for at least a portion of the observed salt accumulation; however, groundwater discharge by evaporation at the ground surface could also be responsible.

During a December 10, 2009 site visit by Worley-Parsons (2010), conditions at the northwestern edge of the playa were investigated. Intermittent salt deposits were observed to be located both in low lying areas and on the tops of low, dissected, mesa-like promontories of Pleistocene lacustrine sediments approximately three feet high that extend into the playa. Deposition of salt by groundwater evaporation at the surface would be expected to occur on the sides as well as the top of these promontories. The occurrence of salt deposits on the top, but not on the sides, suggests that these deposits are the result of salt dissolution from layers with elevated salt content and reposition as soil moisture evaporates at the ground surface. The shallow soil beneath the salt deposits was observed to be wetted to a depth of approximately three inches from a recent rain event, but underlying soil to depths of approximately one foot were observed to be generally dry. As such, evidence of salt deposition by evapotranspiration at the playa surface was not observed in this area during Worley-Parsons' reconnaissance (Worley-Parsons 2010).

Mesquite trees were observed in the area north of the playa, but wetland species or other species indicative of or dependant on shallow groundwater were not observed. Mesquite trees are typically thought to be associated with "shallow" groundwater; however, the term shallow should be understood in a relative sense—the depth to groundwater utilized by mesquite trees may be several tens of feet below the ground surface. This would be too deep to support groundwater discharge at the ground surface. Thus, the presence of mesquite is not necessarily indicative of discharging playas.

In December 2009, Worley-Parsons advanced two hand auger borings to approximately 10 feet bgs beneath the salt pan area in the northwest portion of the playa. The moisture content of the soil was observed to increase with depth in both borings, and free groundwater was encountered at a depth of approximately 8 feet below the playa salt pan surface in one of the borings. Subsurface soil encountered consisted of alternating layers clay/silt mixtures and sandy sediments. A depth of 2 to 3 meters is generally the maximum depth of free water documented beneath discharging playas. This suggests that groundwater could be shallow enough to discharge at the surface by capillary rise and evaporation to occur at least some of the time (Worley-Parsons, 2010).

Based on the above data, salt accumulation at Palen Lake is likely the result of dissolution and recrystallization of existing salt deposits during times of surface water inflow, as well as limited episodic and possibly seasonal or intermittent groundwater discharge. The rate of groundwater discharge in a wet playa is dependent on the depth to groundwater and magnitude of upward vertical gradients, the ability of subsurface materials to facilitate capillary rise, climatic conditions, and the presence and extent of free water, wetlands and salt pans on the playa surface (Tyler, 2005; Allen and Sharike,

2003). In general, groundwater discharge rates are highest when groundwater is shallow, temperatures are high, and when open water or wetlands are exposed at the playa surface.

Increased depth to groundwater, lower temperatures, the presence of coarse grained material that inhibits capillary rise, and the presence of salt pan (which increases albedo) tends to decrease groundwater discharge rates. Based on these factors, discharge of groundwater at Palen Lake appears to be limited based on the depth to groundwater (including absence of vegetation that indicates consistent shallow groundwater), the presence of coarse grained layers that limit capillary rise and the apparent intermittent or episodic nature of discharge.

Groundwater discharge rates were estimated based on reported groundwater discharge rates at other playas, the area of identified salt accumulation, and the evident episodic or intermittent nature of salt accumulation. Measured evapotranspiration rates at Franklin Lake Playa were used to form a basis for this estimate (Czarnecki, 1997). Franklin Lake Playa is a well developed and extensively characterized wet playa in the Death Valley area (USGS, 2007b). Evapotranspiration rates at Franklin Lake Playa are calculated to be 38 to 41 cm/year (1.3 to 1.4 feet/year) based on the Energy-Balance Eddy-Correlation method, which is reported to be the most reliable method by the USGS. WorleyParsons (WPAR, 2010a) suggested that these rates would be a conservative measure of evapotranspiration for active wet playa areas at Palen Lake for the following reasons:

- Franklin Lake Playa is a terminal playa, which is the terminal discharge point of the local groundwater flow system; whereas, Palen Lake is a bypass playa, with most groundwater flowing laterally past the playa.
- Franklin Lake Playa includes extensive groundwater discharge features (e.g., saltpan, puffy ground and halophyte wetlands) that are generally less developed or lacking at Palen Lake, indicating less groundwater discharge would be expected at Palen Lake.
- Evapotranspiration rates at wet playas are temperature dependent, with maximum rates occurring during the summer months. Franklin Lake Playa occurs in Death Valley, where mean annual and summer high temperatures typically exceed those at Palen Lake.
- The available data suggest that groundwater discharge, if it is occurring at Palen Lake, is episodic or intermittent; whereas groundwater discharge at Franklin Lake Playa occurs throughout the year.

The total area of potential groundwater discharge at Palen Lake is estimated to be approximately 2,000 acres, with salt pan occupying approximately 700 acres of this total. Based on a groundwater discharge rate that is approximately half that at Franklin Lake Playa, and is estimated to occur for three months every year, the total discharge rate would be approximately 0.175 feet of water per year. Over an area of 2,000 acres, this equates to approximately 350 afy. (WorleyParsons, 2010a)

Groundwater Budget

The perennial yield (the maximum quantity of water that can be annually withdrawn from a groundwater basin over a long period of time [during which water supply conditions approximate average conditions] without developing an overdraft condition.- CDWR, 1998) of CVGB was estimated to be between 10,000 and 20,000 afy (Hanson, 1992). A perennial yield of 12,200 afy was adopted in the EIS for the Eagle Crest Landfill project in 1992 (BLM and County of Riverside, 1992); however, the amount of recharge from precipitation used to derive this number appears to be based on recharge to only a portion of the basin, so the perennial yield may be underestimated.

Staff compiled a comprehensive water budget based on published literature, water budget information collected by the DWR for updates to the California Water Plan, information obtained from the California State Prison Authority, and the analysis of basin inflow and outflow discussed in the previous two sections. This information is summarized in **Soil and Water Table 8**, below.

Soil and Water Table 8
Estimated Groundwater Budget (afy)

Budget Components	Totals
Inflow	
Recharge from Precipitation	8,588
Underflow from Pinto Valley and Orocopia Valley Groundwater Basins	3,500
Irrigation Return Flow	800
Wastewater Return Flow	831
Total Inflow	13,719
Outflow	
Groundwater Extraction	-10,361
Underflow to Palo Verde Mesa Groundwater Basin	-400
Evapotranspiration at Palen Dry lake	-350
Total Outflow	-11,111
Budget Balance (Inflow-Outflow)	2,608

The analysis suggests that the CVGB is in positive balance (inflow exceeds outflow) by approximately 2,600 afy under average conditions.

Water Bearing Units

The following water-bearing formations have been identified in the CVGB. The extent and relationship of these formations is presented in hydrostratigraphic cross sections A-A' and B-B' included as **Soil and Water Figures 8** and **9.** The location of the cross section is shown on **Soil and Water Figure 10**.

Quaternary Alluvium

Quaternary alluvial fill in the basin consists of Holocene to Pleistocene alluvial fan and fluvial (stream) deposits, as well as lacustrine (lake) and playa (ephemeral lake) deposits (CDWR, 2004). These deposits consist of gravel, sand, silt and clay (CDWR, 1963). In general, coarser alluvial fan deposits are expected near the valley edges and grade into finer distal fan deposits that interfinger with fine grained lacustrine and playa

deposits near the center of the basin. These deposits are typically heterogeneous. Valley axial drainages tend to be more uniform and continuous, and contain a greater proportion of sand and fine gravel. Portions of the basin are also occupied by aeolian (wind blown) sand deposits, but the identified aeolian deposits occur at the ground surface and are of limited thickness. Therefore, they are not believed to be an important water bearing unit.

The majority of the Project site is underlain by a relatively thin veneer of active valley axial alluvial sediments that is in equilibrium (neither eroding or aggrading) and underlain at shallow depth by older alluvium with buried soil horizons (WorleyParsons, 2009b). A seismic shear wave profile investigation indicates that shear wave velocities are highest in a layer that occurs at about 20 to 30 feet below ground surface (bgs), which is consistent with the presence of carbonate cementation (JRA, 2009). Portions of the basin are also occupied by aeolian (wind blown) sand deposits, and these sediments increase in prevalence near Ford Dry lake and the area southeast of the Project site (DWR, 1963; WorleyParsons, 2009b). The identified aeolian deposits occur at the ground surface and are of limited thickness. The Quaternary sediments include the Pleistocene-age Pinto Formation, which consists of coarse fanglomerate (cemented, consolidated or semi-consolidated alluvial fan gravels) containing boulders and lacustrine clay with some interbedded basalt (DWR, 2004).

Pliocene Bouse Formation

The Pliocene Bouse Formation underlies the Quaternary sediments. The Bouse Formation includes a marine to brackish-water estuarine sequence deposited in an arm of the proto-Gulf of California (Metzger, 1968; Wilson and Owen-Joyce, 1994). This formation has alternatively been interpreted as, or may include, lacustrine sediments deposited in a closed, brackish basin (Stone, 2006). The Bouse Formation is widely reported in the Colorado Valley and tributary basins in southeastern California and descriptions of this formation come from occurrences outside of Chuckwalla Valley. It is reported to be composed of a basal limestone (marl) overlain by interbedded clay, silt, sand, and tufa. The top of the Bouse Formation is relatively flat lying with a reported dip of approximately 2 degrees south of Cibola (Metzger and others, 1973). The Bouse Formation in the CVGB is estimated to extend to approximately 2,200 feet bgs (approximately -1,800 feet msl) beneath the site based on geophysical modeling (see WPAR, 2010 Figure 5). These unconsolidated to semi-consolidated sediments are reported to yield several hundred gallons per minute (gpm) to wells perforated in coarse grained units (Wilson and Owen-Joyce, 1994).

Miocene Fanglomerate

The Bouse Formation is unconformably underlain by a fanglomerate composed chiefly of angular to subrounded and poorly sorted partially to fully cemented pebbles with a sandy matrix (Metzger and others, 1973). The Fanglomerate is likely Miocene-age; however, it may in part be Pliocene-age (Metzger and others, 1973). The Fanglomerate represents composite alluvial fans built from the mountains towards the valley and the debris of the Fanglomerate likely represent a stage in the wearing down of the mountains following the pronounced structural activity that produced the basin and range topography in the area (Metzger and others, 1973). Bedding surfaces generally dip from the mountains towards the basin. The Fanglomerate reportedly dips between 2

and 17 degrees near the mountains due to structural warping (Metzger and others, 1973). The amount of tilting indicates a general decrease in structural movements since its deposition (Metzger and others, 1973). The Fanglomerate is estimated to extend to approximately 3,000 feet bgs (-2,600 feet msl) beneath the site based on geophysical modeling by Worley-Parsons (WPAR, 2009).

Bedrock

Bedrock beneath the site consists of metamorphic and igneous intrusive rocks of pre-Tertiary age that form the basement complex (CDWR, 1963). In some areas of the basin, volcanic rocks of Tertiary age overlie the basement complex (CDWR, 1963). These rocks are considered nonwater bearing. The bedrock topography in the study area as interpreted by modeling of Bouger gravity data obtained from USGS is illustrated in **Soil and Water Figure 4** The methods used to model the bedrock topography are discussed in more detail in Genesis Solar Energy Project Application for Certification Appendix D (Worley-Parsons, 2009).

Groundwater Occurrence and Movement

In general, groundwater flow in the basin is south-southeastward (**Soil and Water Figure 7**). Groundwater flow is directed southward from the basin's boundary with the Cadiz Valley Basin and east-southeastward from its boundary with the Pinto Valley Basin, toward the eastern basin boundary where it flows into the adjacent Palo Verde Mesa Basin (Steinemann, 1989). The groundwater gradient is the steepest in the western half of the basin and is nearly flat in the central portion of the basin (CDWR, 1963). Near Ford Dry Lake and east of Ford Dry Lake the gradient becomes steeper as groundwater approaches the narrows in the southeast portion of the basin (Steinemann, 1989; DWR 1963).

Groundwater levels exceed 500 feet msl in the western portions of the basin and fall to less than 275 feet msl near the eastern end of the basin in the narrows between the Mule and McCoy Mountains (Steinemann, 1989). Near Palen Lake, groundwater occurs near the ground surface, resulting in groundwater discharge by evapotranspiration at the land surface. Near Ford Dry Lake, groundwater is reported at depths of 50 feet below ground surface. Beneath the Project site, groundwater occurs at depths of approximately 70-90 feet bgs (approximately 400 feet msl) based on site-specific investigation (WPAR, 2009a). **Soil and Water Figures 11 and 12** present groundwater level contours for 1963 and 1992, respectively.

The DWR reports that groundwater levels in the basin are generally stable (CDWR, 2004). **Soil and Water Figure 13** shows hydrographs for selected wells within the Chuckwalla Valley from 1950 to 2009. The wells selected to present the hydrograph data were chosen to present the most complete set of historic water level elevation data across the Chuckwalla Valley. The hydrographs show that the water level has been generally stable over the last 40 years in the eastern part of the basin. The hydrograph for well 7/20-18H1 in the eastern part of the basin shows a decrease in water level elevation occurred between 1985 and 1990. This well is associated with the Chuckwalla and Ironwood Prisons and the decline in water level is likely due to increased water use at the prisons. The hydrograph for well Township7S Range 18E-14H1 shows a slight (approximately 20 foot) increase in the water level between 1983 and 1992. This well

and the three other wells at this location are associated with agriculture activities and the water level increase is likely due to the fallowing of the land.

Aquifer Characteristics

The basin fill sediments within the CVGB include three aquifers: the alluvium, the Bouse Formation, and the Fanglomerate. Groundwater in the alluvium likely occurs under unconfined conditions but could locally be semi-confined. Groundwater in the Bouse Formation and the Fanglomerate was reported to be under semi-confined to confined conditions based on stratigraphic data and storativity values derived from aquifer pumping tests at the Project (Worley-Parsons, 2010). However, the continuity of confining layers across the basin has not been established and may not be present as you progress toward the alluvial source areas away from the Ford Dry Lake area. **Soil and Water Table 9** summarizes the reported and estimated aquifer properties for these aquifers based on data from specific capacity tests and aquifer pumping tests performed on wells in the CVGB.

Groundwater Quality

Groundwater quality varies markedly in the basin. Groundwater in the western portion of the basin near Desert Center generally contains lower concentrations of total dissolved solids (TDS) than groundwater in the eastern, downgradient portion of the basin near Ford Dry Lake (Steinemann, 1989). Groundwater to the south and west of Palen Lake is typically sodium chloride to sodium sulfate-chloride in character (DWR, 2004). The detected concentrations of TDS in the basin ranges from 274 milligrams per liter (mg/L) to 8,150 mg/L with an average concentration of 2,100 mg/L (Steinemann, 1989). In general, the groundwater in the basin has concentrations of sulfate, chloride, fluoride, and dissolved solids too high for domestic use and concentrations of sodium, boron and dissolved solids too high for irrigation use (DWR, 1975). Several of the wells sampled in the basin contain high levels of fluoride and boron.

Reported water quality of samples collected from wells at the Site is presented in **Soil and Water Table 10**. This table indicates that water quality varies laterally and vertically in the area. Generally, water quality improves vertically with depth and laterally to the south. Vertically, TDS concentrations are generally highest in the alluvium followed by the Bouse Formation and finally by the Fanglomerate.

Calculated TDS concentrations from borehole geophysical logging indicate TDS concentrations as high as 30,500 mg/L within finer grained units (silt and clay) in the alluvium decreasing to less than 5,000 mg/L TDS in more transmissive sediments in the Bouse Formation at depths of 800 to 900 feet bgs (see AFC Appendix D). Laterally, TDS concentrations in groundwater decrease south and southeast of the Site within all three water bearing units in the basin, and are lowest in the are south of I-10, as referenced in **Soil and Water Figure 14.**

Groundwater Wells in Proximity to the Proposed Project

An inventory of groundwater wells in the area was compiled from published literature, review of data from the National Water Information System (NWIS), and by obtaining well completion records from the DWR for wells registered in the eastern Chuckwalla Valley Groundwater Basin. A total of 50 wells were identified, the majority of which were

reported by Worley-Parsons (2010) as abandoned or disused. Information regarding the completion depths, construction details, and status of these wells, to the extent available, is presented in **Soil and Water Table 11** and shown in **Soil and Water Figure 7.**

Soil and Water Table 9
Aquifer Characteristics

Geologic Unit	Well ID	Well Depth (feet)	Specific Capacity (gpm/ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (ft/day)	Storativity (unitless)	Basis
Alluvium (Western Basin)	OW-2	---		224,400	100	0.05	Aquifer test near Desert Center (Eagle Crest Energy Company, 2009)
	CW-1 TO CW-4			56,000	50	0.05	Aquifer test of Eagle Mountain Iron Mine wells (Eagle Crest Energy Company, 2009)
				1,100-16,000	19.6-42	10^2-10^4	Aquifer test conducted for the PSPP
	Average			**74,000**	**53**	**0.05**	---
Bouse Formation (Eastern Basin)	TW-1	50		21,542	3 to 16		Aquifer test and lab analysis conducted for the Project Solar project
	3	957	5	10,000	4		Specific Capacity Test
	26	1,000	1.5	3,000	1		Specific Capacity Test
	29	985	1.6	3,200	1		Specific Capacity Test
	43	830	35	70,000			Specific Capacity Test
	Average			21,500	12 to 14		---
Bouse Formation/ Fanglomerate (Eastern Basin)	33	1,200	14.8	29,600	8	---	Specific Capacity Test
	34	1,200	26.7	53,400	14	---	Specific Capacity Test
	35	1,200	51.6	103,200	28	---	Specific Capacity Test
	36	1,200	15.6	31,200	8	---	Specific Capacity Test
	37	1,050	12.9	25,806	11	0.0002	Aquifer test conducted at State prison
	39	1,139	11.1	22,222	13	---	Specific Capacity Test
	40	1,200	10.3	20,600	5	---	Specific Capacity Test
	42	1,100	19.7	39,444	15	---	Specific Capacity Test
	Average			40,684	13	0.0002	---
Fanglomerate	14	982	2.6	5,200	14		Specific Capacity Test

Notes:
Sources include WCC, 1986; Eagle Crest, 2009; Worley-Parsons, 2009, Solar Millennium, 2010a.
Transmissivity from Specific Capacity Tests calculation by multiplying value by 2,000. for confined aquifers and by 1,500 for unconfined aquifers (Driscoll, 1986).

Soil and Water Table 10
Analytical Results for On-Site Groundwater Samples

Analyte	Well ID	TW-1	TW-1	TW-1	TW-1	OBS-2
	Sample Collection Date	6/5/2009	7/9/2009	7/13/2009	7/16/2009	6/17/2009
	Sample Depth (feet bgs) (1)	Whole Well	Whole Well	Whole Well	Whole Well	800
pH	pH units	7.9@23°C (2)	7.9@19°C	7.9@20°C	7.8@19°C	7.8@21°C
Total Hardness (calc as $CaCO_3$)	mg/L (3)	570	540	490	500	220
Specific Conductance (at 25°C)	µS/cm (4)	19,000	19,000	18,000	18,000	8,800
Total Dissolved Solids @ 180°C (TDS)	mg/L	9,500	10,000	9,500	8,900	5,000
Calcium	mg/L	160	-- (5)	--	--	66
Magnesium	mg/L	38	--	--	--	14
Sodium	mg/L	4,500	4,000	3,600	3,600	1,500
Potassium	mg/L	30	27	24	25	12
Bicarbonate Alkalinity (As $CaCO_3$)	mg/L	--	--	--	96	--
Carbonate Alkalinity (As $CaCO_3$)	mg/L	--	--	--	ND<10 (6)	--
Hydroxide Alkalinity (As $CaCO_3$)	mg/L	--	--	--	ND<10	--
Total Alkalinity (As $CaCO_3$ at pH 4.5)	mg/L	97	83	81	96	150
Chloride	mg/L	5,600	5,300	6,400	4,700	2,300
Sulfate as SO_4	mg/L	1,500	1,400	1,800	1,200	810
Fluoride	mg/L	4.6	6.2	4.6	4.7	1.1
Silica	mg/L	--	--	--	22	19
Dissolved Silica	mg/L	--	--	--	20	15
Sulfide	mg/L			--	ND<0.10	--
Nitrate (NO_3) – N	mg/L	ND<0.25	--	--	ND<0.25	0.5
Nitrite (NO_2) – N	mg/L	ND<0.63	ND<0.25	0.28	ND<0.50	ND<0.25
Total Phosphorus	mg/L	--	--	--	ND<0.10	--
Total Cyanide	mg/L	--	--	--	ND<0.005	--
Antimony	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Arsenic	mg/L	0.024	0.023	0.027	--	0.0092
Barium	mg/L	0.03	0.028	0.027	0.028	0.033
Beryllium	mg/L	ND<0.004	ND<0.004	ND<0.004	ND<0.004	ND<0.004
Cadmium	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Chromium	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Cobalt	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Copper	mg/L	ND<0.010	ND<0.010	ND<0.010	ND<0.010	ND<0.010
Iron	mg/L	1.4	--	--	--	0.46
Lead	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Lithium	mg/L	--	--	--	1.4	--
Manganese	mg/L	0.065	--	--	--	0.029
Mercury	mg/L	ND<0.001	ND<0.001	ND<0.001	ND<0.001	ND<0.001
Molybdenum	mg/L	0.44	0.43	0.4	0.37	0.24
Nickel	mg/L	ND<0.010	ND<0.010	ND<0.010	ND<0.010	ND<0.010
Selenium	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Silver	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Thallium	mg/L	ND<0.002	ND<0.002	ND<0.002	ND<0.002	ND<0.002
Vanadium	mg/L	ND<0.005	ND<0.005	ND<0.005	ND<0.005	ND<0.005
Zinc	mg/L	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10

Notes:

1) bgs = below ground surface
2) °C = Celsius
3) mg/L = milligrams per liter
4) µS/cm - microsiemens per centimeter
5) -- = not analyzed
6) ND<0.10 = not detected above the noted laboratory reporting limit.

SOURCE: Derived from WPAR, 2009b.

Soil and Water 11
Inventory of Wells in the Eastern Chuckwalla Valley Groundwater Basin

Well ID	State Well Number	Other Name	Owner	Installation Date	Use/Status	Well Casing Diameter (inches)	Approximate Ground Surface Elevation (feet msl) (1)	Well Depth (feet bgs) (2)	Screened Interval (feet bgs)	Geologic Unit
OBS-1	N/A (3)	Shallow Observation Well	Genesis Solar, LLC	5/9/2009	Monitoring Well	5	883	155	100 to 150	Alluvium
OBS-2-270 (4)	N/A	Nested Observation Well	Genesis Solar, LLC	7/2/2009	Monitoring Well	N/A	883	270	265 to 275	Bouse Formation
OBS-2-315 (4)	N/A	Nested Observation Well	Genesis Solar, LLC	7/2/2009	Monitoring Well	N/A	883	315	304 to 327	Bouse Formation
OBS-2-370 (4)	N/A	Nested Observation Well	Genesis Solar, LLC	7/2/2009	Monitoring Well	N/A	883	370	359 to 374	Bouse Formation
OBS-2-400 (4)	N/A	Nested Observation Well	Genesis Solar, LLC	7/2/2009	Monitoring Well	N/A	883	400	387 to 418	Bouse Formation
TW-1	N/A	Test Well	Genesis Solar, LLC	5/22/2009	Monitoring Well	5	883	555	340 to 564	Bouse Formation
1	5S/20E-16M1	McCoy Spring and DWR-17	N/A	N/A	Unused	N/A	889	N/A	N/A	N/A
2	6S/18E-36E1	N/A	CA Jojoba Research and Development	12/18/1981	Irrigation	10 to 6	424	940	250 to 290; 770 to 810	Alluvium/Bouse Formation
3	6S/18E-29	Siddall Well	Agra Energy Corp.	2/26/1982	Irrigation	20 to 8	498	957	560 to 940	Bouse Formation
4	6S/19E-19J1	N/A	N/A	N/A	Unused	12	354	N/A	N/A	N/A
5	6S/19E-25P1	N/A	N/A	N/A	Unused	10	360	85.7	N/A	Alluvium
6	6S/19E-25R1	N/A	N/A	N/A	Destroyed	10	360	61.9	N/A	Alluvium
7	6S/19E-25	NOS 1A, 1B, 1C	USGS (5)	N/A	Exploratory Borehole	N/A	358	N/A	N/A	N/A
8	6S/19E-26Z1	N/A	N/A	N/A	Destroyed	N/A	N/A	N/A	N/A	N/A
9	6S/19E-28R1	N/A	N/A	N/A	Unused	N/A	354	N/A	N/A	N/A
10	6S/19E-29E1	N/A	N/A	N/A	Destroyed/ Collapsed	6	377	N/A/19.7 (6)	N/A	N/A
11	6S/19E-30H1	N/A	N/A	N/A	Destroyed	6	370	28.7	N/A	Alluvium
12	6S/19E-31Z1	N/A	N/A	N/A	Destroyed	N/A	N/A	N/A	N/A	N/A
13	6S/19E-32	N/A	Jacado Agri Corp.	6/27/1982	Destroyed (g)	22 to 18 to 12	392	732	307 to 327; 365 to 732	Bouse Formation
14	6S/19E-32	N/A	Lorne Froats	5/1/1991	Domestic/ Irrigation/ Dust Control	12 to 10	392	982/450 (6)	890 to 940	Fanglomerate
15	6S/19E-32K1	N/A		N/A	N/A	12.5	390.2	N/A/526 (6)	N/A	Bouse Formation
16	6S/19E-32K2	N/A		N/A	N/A	10.5	390	--/297 (6)	N/A	Bouse Formation
17	6S/19E-33A1	Hopkins Well and DWR-33X1	N/A	1911	Destroyed	12 to 8	361	1200/267 (f)	1,175 to 1,200	Fanglomerate
18	6S/19E-34	N/A	So Cal Gas	4/29/1989	Anode	1	368	400	200 to 400	Alluvium/Bouse Formation
19	6S/19E-34	N/A	So Cal Gas	7/15/1981	Other	N/A	369	274	0 to 274	Alluvium/Bouse Formation
20	6S/19E-36A1	N/A	N/A	N/A	Destroyed	10	365	64.8	N/A	Alluvium
21	6S/20E-30Z1	Ford Well	N/A	N/A	Stock; Destroyed	10	N/A	N/A	N/A	N/A
22	6S/20E-33L1	N/A	N/A	N/A	Destroyed (g)	N/A	387.60	1,197	N/A	Bouse Formation
23	6S/20E-33C1	N/A	N/A	N/A	Monitoring	10	392.10	400.00	N/A	Bouse Formation
24	6S/20E-33	N/A	Sol Cal Gas	4/29/1989	Andoe	1	397.00	435	235 to 435	Alluvium/Bouse Formation
25	6S/20E-33	N/A	Sol Cal Gas	7/20/1981	Other	N/A	397	278	0 to 278	Alluvium/Bouse Formation
26	7S/18E-14F1	N/A	U.S. AgriResearch and Development	12/26/1982	Irrigation	16 to 10	562.58	1,000/952 (6)	410 to 630; 750 to 770; 810 to 870	Alluvium/Bouse Formation

Soil and Water 11
Inventory of Wells in the Eastern Chuckwalla Valley Groundwater Basin

Well ID	State Well Number	Other Name	Owner	Installation Date	Use/Status	Well Casing Diameter (inches)	Approximate Ground Surface Elevation (feet msl) (1)	Well Depth (feet bgs) (2)	Screened Interval (feet bgs)	Geologic Unit
27	7S/18E-11N1	N/A	N/A	N/A	Unused	16	555	486.4	N/A	Bouse Formation
28	7S/18E-11R1	N/A	N/A	N/A	Unused	16	520	779.4	N/A	Bouse Formation
29	7S/18E-14H1	N/A	U.S. AgriResearch and Development	1/16/1983	Irrigation	10	545.91	985/950 (6)	420 to 460; 500 to 520; 540 to 580; 620-820; 840-990	Bouse Formation
30	7S/18E-14H1	N/A	N/A	N/A	Destroyed	6	546	123.9	N/A	Alluvium
31	7S/19E-4R1	Teaque Well	N/A	N/A	Unused	12	423.89	242.2	N/A	Alluvium
32	7S/20E-4R1	Vada McBride	N/A	N/A	Unused	16	418.00	315.7	N/A	Bouse Formation
33	7S/20E-16M1	N/A	CA Department of Corrections	N/A	N/A	30 to 16	456.02	1,200	690 to 1190	Bouse Formation/ Fanglomerate
34	7S/20E-17L1	WP-4	CA Department of Corrections	9/8/1992	Public Water Supply	24	458.30	1,200	690 to 1190	Bouse Formation/ Fanglomerate
35	7S/20E-17K1	N/A	CA Department of Corrections	12/20/1989	N/A	30 to 16	456.48	1,200	690 to 1190	Bouse Formation/ Fanglomerate
36	7S/20E-17G1	N/A	CA Department of Corrections	12/30/1987	Industrial	30 to 16 to 10	443.54	1,200	690 to 1190	Bouse Formation/ Fanglomerate
37	7S/20E-17C1	78	N/A	1981	Irrigation	14 to 10	433.09	1,050	750 to 1,050	Bouse Formation/ Fanglomerate
38	7/20E-17C2	observation well 1	CA Department of Corrections	6/20/1986	Monitoring	1 1/4	433	1,040	795 to 815 and 995 to 1,015	Bouse Formation/ Fanglomerate
39	7S/20E-18H1	59/observation well 2/Vada McBride	N/A	1959	Irrigation	15 to 12	442.94	1,139	853 to 1,083	Bouse Formation/ Fanglomerate
40	7S/20E-18K1	WP-6	CA Department of Corrections	11/4/1992	Public Water Supply	15 to 10	449.40	1,200	690 to 1,200	Bouse Formation/ Fanglomerate
41	7S/20E-18R1	WP-5	CA Department of Corrections	10/24/1992	Public Water Supply	13.5 to 10	453.60	1,160	N/A	Fanglomerate
42	7S/20E-20B1	79/observation well 3	N/A	6/4/1905	Irrigation	16 to 12	470.00	1,100	738 to 1,100	Bouse Formation/ Fanglomerate
43	7S/20E-28C1	7S/20E-28F1/80	Jojoba Inc.	3/15/1982	Irrigation	10 to 8	505.60	830	510 to 600 and 680 to 780	Bouse Formation
44	7S/20E-28C2	N/A	Jojoba Southwest	11/30/1989	Irrigation	16 to 12	505.30	1,100	700 to 1,100	Bouse Formation/ Fanglomerate
45	7S/20E-28	N/A	Chuckawalla Jojoba inc Great American Securities	6/6/1989	Test Hole/Abandoned	N/A	505	825	N/A	N/A
46	7S/20E-27L1	N/A	N/A	N/A	Destroyed	8	517.00	53.6	N/A	Alluvium
47	8S/20E-10N2	60	N/A	1984	N/A	4	621	872	500 to 580; 620 to 640; 710 to 850	Bouse Formation
48	4S/16E-32M1	N/A	N/A	N/A	N/A	N/A	548	N/A	N/A	N/A
49	4/S17E-6C1	N/A	N/A	N/A	N/A	N/A	500	N/A	N/A	N/A
50	6S/17E-3M1	N/A	N/A	N/A	N/A	N/A	566	818	N/A	Bouse Formation
51	5S/17E19Q1	N/A	N/A	N/A	N/A	N/A	538	760	N/A	N/A
52	5S/16E-7M1	N/A	N/A	N/A	N/A	N/A	603.67	648	N/A	N/A
53	5S/16E-7P1	N/A	N/A	N/A	N/A	N/A	598	347	N/A	N/A
54	8S/20E-28N1	N/A	N/A	N/A	N/A	N/A	654.5	500	N/A	Bouse Formation

Notes:

1) - msl = above mean sea level
2) -bgs = below ground surface

3) N/A = information not available or unknown
4) Nested pressure transducer buried in place.
5) USGS-NWIS = United States Geological Survey - National Water Information System (USGS-NWIS) website at http://nwis.waterdata.usgs.gov/ca/nwis/gwlevels
6) 1,000/952 = reported well depth/measured well depth. Well depth was measured by WorleyParsons or Azca Drilling.
7) Well could not be located by WorleyParsons. Reported as destroyed.

SOURCE:WPAR, 2009b.

Surface Water Hydrology

The site is located within the Colorado River Basin, within the Chuckwalla Valley Drainage Basin. There are no perennial streams in Chuckwalla Valley. Chuckwalla Valley is an internally drained basin, and all surface water flows to Palen Dry Lake in the western portion of the valley and Ford Dry Lake in the eastern portion of the valley.

Palen Dry Lake is a “wet playa” with significant shallow groundwater discharge at the ground surface by evaporation; whereas, Ford Dry Lake is a “dry playa,” with groundwater occurring well below the ground surface. Palen Dry Lake is located in the central portion of Chuckwalla Valley about 11 miles west of the proposed plant location at the site.

The only perennial surface water resources in the eastern portion of Chuckwalla Valley are McCoy Spring, at the foot of the McCoy Mountains approximately 6.5 miles northeast of the site and 7.5 miles northeast of the proposed well field, and Chuckwalla Spring, approximately 15 miles south of the site at the foot of the Chuckwalla Mountains.

Off-site storm water flows impacting the project site are from a large watershed area to the north of the site which covers approximately 91,627 acres. The upstream extents of the contributing watersheds extend into the Palen Mountains. The extents of the watershed impacting the project were delineated utilizing existing USGS digital elevation model data and are shown on **Soil and Water Figure 15** which was taken directly from the preliminary Drainage Erosion and Sediment Control Plan (DESCP)(GSEP 2009a).

The overall offsite watershed impacting the project has been divided into three distinct sub-basins in the DESCP for the purpose of designing and sizing engineered channels to collect flow and convey it around and through the Project site. However, the boundaries of the sub-basins are not well defined and are subject to change depending on the magnate of the flow event and the propensity for the small drainages to migrate in response to erosion and sediment deposition. Peak discharges for each sub-basin were calculated using the Bently Pondpack software package and generally followed the guidelines presented in the *Riverside County Flood Control and Water Conservation District Hydrology Manual.* The results of the peak discharge analysis are summarized in **Soil and Water Table 12*.***

A comparison was made between the discharge data provided as part of the Conceptual Drainage Study and discharges obtained using the USGS Regional Regression Equation for the region. The purpose of the comparison was to provide some insight into the reasonableness of the calculated discharges when compared to some other regionally accepted methodology. The discharges presented in the Concept Drainage Study (GSEP 2009a) were significantly lower than those calculated using the

regional regression equations. The subject area is likely significantly flatter with much more dispersed flow than the “average” watershed used in the derivation of the regional regression equation, which could account for lower discharges for the larger watersheds. Overall, the reported discharges appear to fulfill the purpose of design given the site specific watershed conditions.

Soil and Water Table 12
Summary of Offsite Peak Discharges

Sub-basin ID	Sub-basin Area (Sq. Mi.)	Q100 (cfs) (HEC-HMS)	Q100 (cfs) (Regression)*
1	27.9	4070	11,476
2	17.2	2203	8,140
3	98.1	10,022	28,022

Dry Washes

There are no perennial streams in Chuckwalla Valley and a vast majority of the time, the area is dry and devoid of any surface flow anywhere. Water runoff occurs only in response to infrequent intense rain storms. Much of the area is subject to inundation either by sheet flow or weakly-expressed braided ephemeral surface water flow. The entire area drains to Palen and Ford Dry Lakes, but runoff from most of the basin generally does not reach these dry lakes. During large rainfall events, Ford Dry Lake and Palen Dry Lake will retain water in shallow ponds for days or weeks. This occurs on average approximately once every 20 years (RCFCWCD, 2009). There are no named ephemeral washes within the Project site, however, a few ephemeral washes are located upslope of the Project site or traverse the southeastern part of the proposed off-site linear alignment. The Project site itself is located in an area where washes disperse into a subdued bar and swale morphology, with widely dispersed swales that are small, only a few inches deep and do not have defined banks (Worley Parsons, 2009b).

There are numerous small dry washes which traverse the site which have no or poorly developed banks. These channels are typically very subtle, with a width of 2 to 8 feet and a depth of 3 to 9 inches. These features are poorly expressed and can be difficult to discern on aerial photography. Many of these channels do not reach the dry lake but fade out on the vegetated sand dune surface. The conveyance capacity of these washes is limited and runoff during moderate to large events will break out of these features and be conveyed across the terrain as shallow sheet flow.

Springs, Seeps and Playa Lakes

A comprehensive review was conducted to identify potential springs, seeps and surface water discharges that may be present in the central and eastern portions of Chuckwalla Valley (the area that may be affected by drawdown from project pumping). Sources reviewed included published reports and maps by the United States Geological Survey and California Department of Water Resources, maps published by the Bureau of Land Management, and contact with BLM personnel. The only springs, seeps or surface discharges identified are McCoy Spring (at the foot of the McCoy Mountains approximately 6.5 miles northeast of the Project site and 7.5 miles northeast of the proposed well field), and Chuckwalla Spring (approximately 15 miles south of the site, which is actually located outside the valley a short distance in the Chuckwalla

Mountains) (BLM, 2002 and 2009b; DWR, 1963; RWQCB, 2006; Stone and Pelka, 1989; and USGS, 1983a, 1983b). McCoy Spring and Chuckwalla Spring are perennial springs; however, there is no information available regarding the discharge quantity for these springs. Published water quality data for McCoy Spring is included in DWR, 1963.

McCoy Spring is located at an elevation of 889 feet msl at the outlet of a bedrock canyon near the toe of the western slope of the McCoy Mountains, and includes a cistern and seeps. Based on the close proximity of bedrock outcrops to the spring and seeps, the spring likely represents baseflow discharge from the McCoy Mountains. As such, it would not have a direct hydraulic connection to the aquifers in the Chuckwalla Valley Groundwater Basin, which occur in the basin fill materials to the west of McCoy Spring.

Storm Water Flow

Storm water flow across and adjacent to the project occurs in a network of shallow and poorly expressed alluvial channels, and during larger events, as widespread sheetflow. The applicant completed existing conditions FLO-2D modeling on the project to provide information regarding the extents, depths, and velocities of surface flow across the project during the 100-year event as well as for more frequent storm events. The results of the analysis confirm the presence of general widespread and shallow sheet flooding across the site and do not provide resolution on the distribution of flow in individual washes due to a lack of detailed topographic data and the fact that the washes are so poorly expressed.

Surface and Groundwater Beneficial Uses

The Basin Plan for the CRBRWQCB establishes water quality objectives, including narrative and numerical standards that protect the beneficial uses of surface and ground waters 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.

Beneficial water uses are of two types – consumptive and non-consumptive. Consumptive uses are those normally associated with people's activities, primarily municipal, industrial and irrigation uses that consume water and cause corresponding reduction and/or depletion of water supply. Non-consumptive uses include swimming, boating, waterskiing, fishing, and other uses that do not significantly deplete water supplies.

1. Past or Historical Beneficial Uses
    a. Historical beneficial uses of water within the Colorado River Basin Region have largely been associated with irrigated agriculture and mining. Industrial use of water has become increasingly important in the Region, particularly in the agricultural areas.

2. Present Beneficial Uses
    a. Agricultural use is the predominant beneficial use of water in the Colorado River Basin Region, with the major irrigated acreage being located in the Coachella, Imperial and Palo Verde Valleys. The second in quantity of usage is the use of

water for municipal and industrial purposes. The third major category of beneficial use, recreational use of surface waters, represents another important segment of the Region's economy.

3. Sources of Drinking Water Policy

   a. All surface and ground waters are considered to be suitable, or potentially suitable, for municipal or domestic water supply with the exception of:

      i. Surface and ground waters where: the TDS exceed 3,000 mg/L, and it is not reasonably expected by the Regional Board to supply a public water system, or

      ii. There is contamination, either by natural process or by human activity, that cannot be treated for domestic use using either Management Practices or best economically achievable treatment practices, or

      iii. The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

Existing uses of waters from springs in the Colorado River Basin include the Box Spring, Crystal Spring, Old Woman Spring, Cove Spring, Mitchell Caverns Spring, Bonanza Spring, Agua Caliente Spring, Kleinfelter Spring, Von Trigger Spring, Malpais Spring, and Sunflower Spring. Based on a review of available information include the USGS NWIS database, USGS quadrangle maps and data provided by the BLM, none of these springs are within the area that would be influenced by the project. Existing uses of water from springs in the Colorado River Basin include Bousic Spring, Veale Spring, Nett Spring, Gordon Spring, and Arctic Canyon Spring. None of these springs are within the area that would be influenced by the project.

Water quality objectives are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

1) **General Surface Water Objectives** (CRBRWQCB)

   a. Aesthetic Qualities - All waters shall be free from substance attributable to wastewater of domestic or industrial origin or other discharges which adversely affect beneficial uses not limited to: setting to form objectionable deposits; floating as debris, scum, grease, oil, wax, or other matter that may cause nuisances; and producing objectionable color, odor, taste, or turbidity.

   b. Tainting Substances – Waters shall be free of unnatural materials which individually or in combination produce undesirable flavors in the edible portions of aquatic organisms.

   c. Toxicity – All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or indigenous aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, 96-hour bioassay or bioassays of appropriate duration or other appropriate methods as specified by

the CRBRWQCB. Effluent limits based upon bioassays of effluent will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data to become available, and source control of toxic substances will be encouraged. 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 other control water which is consistent with the requirements for "experimental water" as described in Standards Methods for the Examination of Water and Wastewater.

d. Temperature – temperature shall not be altered.

e. pH – shall range from 6.0 to 9.0

f. Dissolved Oxygen – shall not be reduced below the following minimum levels at any time: warm – 5.0 mg/L, cold – 8.0 mg/L, and warm and cold – 8.0 mg/L

g. Total Dissolved Solids – discharges of wastes or wastewater shall not increase the total dissolved solids content of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such an increase in total dissolved solids does not adversely affect beneficial uses.

h. Bacteria – The geometric mean of the indicated bacterial densities should not exceed one or the other of the following: E. coli – 630 colonies (col) per 100 ml and enterococci – 165 col per 100 ml. Nor shall any sample exceed one other following maximum allowable: E.coli 2000 col per 100 ml and enterococci 500 col per 100 ml.

Any discharge, except from agricultural, shall not cause concentration of total dissolved solids in surface waters to exceed the following limits:

	TDS (mg/L)	
Location	**Annual Average**	**Maximum**
Coachella Valley Drains	2,000	2,500
• Palo Verde Valley Drains	2,000	2,500

2) **General Groundwater Objectives**: Establishment of numerical objectives for groundwater involves complex considerations and it is acknowledged that the quality of groundwater varies significantly throughout the CVGB and varies with depth. It is the CRBRWQCB's goal to maintain the existing quality of non-degraded groundwater basins and to minimize the quantities of contaminants reaching any groundwater basin.

a. Groundwater designated for domestic or municipal supply shall not contain taste or odor producing substances

b. Groundwater designated for domestic or municipal supply shall not contain coliform organisms in excess of limits specified in the regulations.

c. Groundwater designated for domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, Title 22 regulations.

d. Discharges of water softeners regeneration brines, other mineralized wastes, and toxic wastes to disposal facilities which ultimately discharge in areas where such waste can percolate to ground waters useable for domestic and municipal purposes, are prohibited.

Wastewater reclamation and reuse is encouraged, however, such use must meet applicable water quality standards.

C.9.4.2 ASSESSMENT OF DIRECT AND INDIRECT IMPACTS AND DISCUSSION OF MITIGATION

The direct potential effects of the Project on local water resources are those associated with using groundwater for construction (specifically for demands during site grading) and with the plant's operational process water demand. No surface water will be used, though Project construction and operation may have an effect on the ephemeral washes traversing the site, or springs and wet playas.

Potential impacts on water resources during construction and operation include soil erosion, geomorphology, groundwater basin balance, groundwater levels, groundwater quality, surface water hydrology, and surface water quality impacts.

Soil Erosion

Erosion is the displacement of solids (soil, mud, rock, and other particles) by wind, water, or ice and by downward or down-slope movement in response to gravity. Due to generally flat terrain, the Project site is not prone to significant mass wasting (gravity-driven erosion and non-fluvial sediment transport).

Environmental impacts associated with the construction and operations of the Project are discussed in the following sections. Significance criteria were developed based on California CEQA Guidelines and evaluated using accepted methodologies and professional judgment. Impacts would be considered significant if:

- Substantially increased wind or water-induced soil erosion occurred as a result of Project construction or operation;
- Substantially increased sedimentation occurred in areas adjacent to construction areas;
- Construction activities were to occur in areas of high erosion susceptibility and the disturbed areas were left exposed and not properly stabilized; or
- Prime Farmlands, Farmlands of Statewide Importance, or Unique Farmland were lost as a result of erosion.

Grading of the Project site will result in a less than one percent slope downward from the north to the south of the site. Earthwork associated with the Project will include excavation for foundations and underground systems, and the total earth movement

that will occur is approximately 1,000,000 cubic yards. Cut and fill will be balanced on site and there will be no need to either import or export earthen material.

The vast majority of the Project grading and excavation will occur on the Project site with only minor grading and excavation needed for the transmission line (at the locations of the monopoles) as well as the gas pipeline and access road. Known onsite soil types that will be affected by Project grading and excavation are listed in Section C.9.4.1. The wind erosion hazard is moderate to high. During construction, the area within the plant site fence line (1,800 acres) will be disturbed. There also will be small, localized disturbance at the specific locations where transmission structures will be installed.

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 implementation of BMPs such as straw bales, silt fences, and limiting exposed areas as detailed in the DESCP (see Condition of Certification **SOIL&WATER-1**, erosion is expected to be mitigated to a less than significant level. 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 or near the Project site.

Construction and Operation

Wind Erosion

The potential for soil loss by wind erosion was estimated using the Wind Erosion Prediction System for pre-development (undisturbed), during construction, and operational conditions.

The area of the Project site and Project-related off-site linears has a moderate to high potential for wind and water erosion. The Wind Erosion Prediction System (WEPS) model was used to estimate soil loss due to wind erosion. Wind erosion rates at this project are an order of magnitude higher than soil erosion by rainfall runoff at this location due to the relatively low annual rainfall amount and the presence of fine, sandy soils. The results are presented in **Soil and Water Table 13** presented below.

Soil and Water Table 13
Estimate of Soil Loss by Wind Erosion Using
Wind Erosion Prediction System (WEPS)(1) Model

Description	Acres(2)	Predicted Soil Loss (tons per acre per year)	Wind Erosion Soil Loss (Tons per year)
No Project	1,800	72.88	131,184
On-Site Project Construction (no BMPs)	1,800	27.82	50,076
On-Site Project Construction (with BMPs)	1,800	1.25	2,250
Off-Site Linear Construction (with BMPs)	61	0.63	11
Project Operation (with BMPs)	1,650	1.25	2,063

Notes:
(1) Wind Erosion Soil losses (tons/acre/year) are estimated using WEPS software (NRCS, 2008). The soil characteristics were estimated using WEPS soil profiles corresponding to the mapped soil unit. Estimates of annual soil losses use the WEPS soil loss times the affected area. Off site linear construction will take less than one year.
(2) Project Acreages based on the assumption that 100 percent of the project site will be graded. Off-site area acreages are based on project disturbance table for acreage outside the project footprint.
WEPS Assumptions:
Climate and wind data from Blythe, CA.
BMPs for the project site include fencing the area and applying dust palliatives at least annually. BMPs for the off site linears do not include fencing the area.
Source: WPAR, 2009.

Under current conditions, these processes are in relative equilibrium with ongoing depositional processes and soil loss is estimated at approximately 72.88 tons per acre per year or 131,184 tons for the proposed project area of 1,800 acres (WPAR, 2009). Construction without implementation of BMPs would result in a potential for soil loss of about 50,000 tons; however, the implementation of BMPs is expected to reduce water and wind erosion of soils during construction to less than 2,250 tons. Based on the conceptual grading plan (WPAR, 2009; see Appendix A) for the Project site, construction will require cut and fill activities on the Project site, but import/export of earthen materials to and from the Project site will not be required.

Roads and paved areas will be kept free of dust, dirt and visible soil materials. Materials will be kept on site to implement temporary control measures during the operational life of the Project.

Impacts of project operations on the proposed rerouted desert washes are discussed in Section C.2, Biological Resources. As discussed in Air Quality, Section C.1, by its nature, a solar thermal project must keep dust to a minimum, as a film on the collectors of the solar array will reduce their efficiency for power production. Dust control will be achieved by a combination of soil stabilizers, water from the collector washing and waste cooling water, and compaction of the driving surface over time. Therefore, operational controls designed to control dust are expected to reduce the overall soil erosion in the area. Therefore, potential construction and operational-related impacts to onsite soils would be confined to the Project site and related off-site linears. With implementation of BMPs as detailed in the DESCP (see Condition of Certification **SOIL&WATER-1**, erosion is expected to be mitigated to a less than significant level.

Water Erosion

For potential soil loss associated with water erosion, it was assumed that100 percent of the project site would be graded. Those estimates are detailed in **Soil and Water Table 14**.

To address the management of sediment transport, erosion, and sedimentation during operation, the project design will incorporate diversion berms, channels, and detention basins, as discussed in Section C.9.12 *Conditions of Certification/Mitigation Measures.* Dirt roads and exposed surfaces will be periodically treated with dust palliatives as needed to reduce wind erosion. Construction and maintenance of the proposed drainage and sediment management system at the Project site is expected to reduce water and wind erosion at, and downstream of, the Project site to less than significant levels.

Soil and Water Table 14
Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)[1]

Feature (acreage)[2]	Activity	Duration (months)[3]	Soil Loss (tons) w/o BMPs	Soil Loss (tons) with BMPs	Soil Loss (tons/yr) No Project
Project Site (1,800 acres total graded)	Grading Construction	6 9	441.0 1,396.5	6.93 21.95	1.53 ---
Roads 15.76 acres)	Grading Construction	3			
Transmission lines (9.18 acres for construction;0.05 acres for pole footprints	Grading Construction	2 4	0.0041 1.499	0.000064 0.0236	0.00043 ---
Natural Gas Pipeline (36.36 acres for construction; 2.91 acres for trench)	Grading Construction	2 3	0.238 4.454	0.0037 0.0699	0.00247 ---
Project Soil Loss Estimates (Construction)	All activities listed above		1,845.63	29.00	1.16
Project Annual Soil Loss Estimate (Operation (1,650 acres exposed soil)		12		12.71	

Notes:
[1] Water Erosion Soil losses (tons/acre/year) are estimated using RUSLE2 software. (NRCS, 2002) The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit. Estimates of actual soil losses use the RUSLE2 soil loss times the duration and affected area. The No Project Alternative estimate does not have a specific duration, and loss is given in tons/year.
[2] Project Acreages based on the assumption that 100 percent of the project site will be graded. Off-site area acreages are based on project disturbance table for acreage outside the project footprint.
[3] Duration of activities based upon assumptions in the Plan of Development (Genesis Solar, LLC, 2009)
RUSLE2 Assumptions:
100-ft slope length, 2 percent slope
Construction and Grading soil losses assume the following inputs: Management - bare ground; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.
Construction and Grading with BMP and Annual Operational soil losses assume the following inputs: Management – Silt fence; Contouring - Perfect, no row grade; Diversion/terracing - None; Strips and Barriers- 2 fences, 1 at end of slope.
No Project soil losses assume the following inputs: Management - Dense grass, not harvested; Contouring -None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.
Source: WPAR, 2009.

Mitigation

Construction and operation of the Project could result in significant impacts related to water erosion of soils. Implementation of BMPs and condition of certification would reduce the impacts to insignificant. Implementation of Conditions of Certification **SOIL&WATER-1**, and **SOIL&WATER-8** through **-11** and **-13** described in detail in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, would ensure there would be no potential for impacts to soils related to water erosion.

Geomorphology

The Project involves a series of solar arrays within a roughly 1,800 acre rectangular shaped parcel and linears (access road, gas line, transmission lines) involving approximately 90 acres. The method of construction is important in assessing the potential impact to geomorphological conditions associated with the solar arrays and linears. Solar array construction will involve mass grading that will require drainage to be intercepted up-gradient and routed around the arrays to the down-gradient side of the facility to continue flow. Construction of the linears will involve placement of an underground gas line, electric transmission line towers and an access road. The underground gas lines finish grade will be close to exiting ground surface contours and thus have a minimal affect on aeolian systems. The overhead transmission lines will have a minimal effect on aeolian systems and only in areas of the proposed tower foundations. The current design for the proposed access road involves a low relief road close to existing contours that will not adversely affect aeolian sand migration but may require some special design considerations where it crosses existing drainages.

Impacts to the Qal

The Qal is a relatively stable surface, with little evidence of active sand transport. The presence of the gravel with desert pavement and varnish is evidence that this surface is also stable from a fluvial perspective (i.e. that the small channels, while potentially prone to lateral migration and avulsion across the stable surface, do not tend to cut vertically into the surface. From a geomorphic perspective, construction of the project on the Qal area should have relatively little off site impact. Because there is little sediment transport occurring on this surface construction of the proposed project does not appear likely to disrupt the movement of sediment to habitat areas elsewhere. No mitigation is required or proposed.

Impacts to the Qsr

The Qsr is a relatively stable surface, with little evidence of active sand transport. The presence of the soil horizons is evidence that this surface is also stable from a fluvial perspective (i.e. that the small channels, while laterally active, do not tend to downcut or fill vertically). From a geomorphic perspective construction of the project on the Qal area should have relatively little off site impact. Because there is little sediment transport occurring on this surface construction of the proposed project does not appear likely to disrupt the movement of sediment to habitat areas elsewhere. No mitigation is required or proposed.

Impacts to the Qsad/Chuckwalla Wind Transport Corridor

The western array avoids the Chuckwalla sand transport corridor as mapped by Dr. Kenney (WPAR, 2010). The eastern array intrudes into the corridor by approximately 1,600 feet at a point where the corridor is 24,000 feet wide. This intrusion represents about 7 percent of the Chuckwalla sand corridor width. This part of the corridor does not appear to be the most active with regard to sediment transport rates (based on the amount of sand in storage on the ground, evidence for sand transport from ripples and coppice dunes etc) so the reduction in sediment transport capacity is not considered a significant impact. Based on the degree of intrusion into the corridor and the length of the intrusion it was estimated that an area of 157 acres of vegetated sand dune (Qsad) downwind of the intrusion that might be expected to experience moderate impacts from loss of sand due to the project site (see Soil and Water Appendix E - Figure 17).

Impacts to the Palen-McCoy Wind Transport Corridor

The eastern solar array intrudes into the Palen-McCoy corridor by approximately 2,800 feet at a point where the corridor is 15,000 feet wide (cutting off 19 percent of the corridor). Although the project cuts off a large area of corridor, there is good evidence to suggest that most sand transport takes place east of this zone (outside the project footprint, though within the area crossed by the laterals). Plates 14 and 15 of the Worley Parsons report (WPAR, 2010) show field conditions in the impacted area (WPAR, 2010-Plate 14) and further east (WPAR, 2010-Plate 15), providing evidence of much greater rates of sand transport to the east of the project footprint. In the absence of quantitative data and conservatively assuming that the rate of sediment transport is half as much in the outer corridor as it is in the inner corridor the intrusion probably represents less than a 10 percent reduction in sand transport. Based on the photos it is feasible that the true rate of sediment transport in the impacted area may be an order of magnitude less than this. However, although the magnitude of impact to the entire wind transport corridor is relatively low, the area of off-site impacts immediately downwind of the project is large: the lee area downwind of the project that is likely to experience sand depletion is 309 acres (see Appendix E-Figure 17). Since there are 13 acres of overlap from both wind shadows, the combined area impacted by intrusions into both corridors is 453 acres. This area would be expected to experience deflation (loss of sand from the existing vegetated dunes over time) and armoring (coarsening of the sand and gravel as fine sand is eroded by the wind). Condition of Certification **SOIL&WATER-1** will address issues related to minimizing/eliminating creation of barriers to wind and water transport. In addition, Condition of Certification **SOIL&WATER-13** will address concerns related to infilling of channels by wind transport of sediment. Consequently, potential impacts to drainage channels related to location in sand transport areas is believed to be mitigated to less than significant with implementation of Conditions of Certification **SOIL&WATER-1** and **-13**.

With respect to potential impacts and mitigation related to Mojave Fringe Toad Lizard habitat, the reader is directed to Section C.4 Biological Resources.

Impacts to the Qsa

The Qsa is the active area of sand dunes supplied by wind and water transport from the Palen – McCoy Valley sand corridor. This corridor supplies significant sand dune habitat downwind. This area is crossed by the laterals near Wiley Wells Rest Stop.

The main project footprint should avoid this area completely since large scale obstruction of this unit would be hard or impossible to mitigate for. The project should be able to avoid or minimize impacts created by the laterals within this zone by avoiding creation of barriers to wind and water transport as indicated in Condition of Certification/Mitigation Measures described in **SOIL&WATER-1**. Most wind-borne transport of sand occurs within 3 feet of the ground, so infrastructure should be constructed flush with the surrounding ground surface and without ground level obstructions. Power pylons should not pose a significant problem due to their small surface area at ground level. Water and gas pipelines should be buried below ground. Road surfaces should be flush with the ground surface. The amount and quantity of drainage ditches running perpendicular to the wind direction (approximately north-south in the northern section of the lateral route, shifting to west-east in the southern area) should be minimized. Condition of Certification **SOIL&WATER-1** will address issues related to minimizing/eliminating creation of barriers to wind and water transport. In addition, Condition of Certification **SOIL&WATER-13** will address concerns related to infilling of channels by wind transport of sediment. Consequently, potential impacts to drainage channels related to location in sand transport areas is believed to be mitigated to less than significant with implementation of Conditions of Certification **SOIL&WATER-1** and **-13**.

With respect to potential impacts and mitigation related to Mojave Fringe Toad Lizard habitat, the reader is directed to Section C.4 Biological Resources.

Groundwater Basin Balance

Staff evaluated whether the amount of groundwater used for both construction and operations would place the groundwater basin into overdraft. Groundwater overdraft is "the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions." (CDWR, 1998).

As previously indicated, the CVGB is an unmanaged groundwater basin where overlying property owners withdraw groundwater for beneficial use. Typically this use has been for municipal and domestic, agricultural and industrial purposes. For purposes of impact analysis, it is assumed that any withdrawals that exceed the average natural recharge and exceeds a significant percentage of the total amount of groundwater in storage would be a significant impact. The following discussion presents an analysis of the potential for overdraft to occur.

Construction and Operations

The project has proposed to utilize underlying groundwater to supply project water needs during construction. There is a concern that the water demand of the project will exceed the groundwater basin budget and lead to overdraft conditions.

A comparison was made between the average annual basin budget with the anticipated project water production requirements. **Soil and Water Table 15** presents the anticipated projects water requirements along with the average annual basin budget for the 37-month construction period. Currently, the CVGB balance is positive by approximately 2,608 afy whereby inflow (approximately 13,719 afy) to the basin is

slightly greater than estimated outflows (approximately 11,111 afy) to the basin. Approximately 400 afy of the outflow is attributed to subsurface outflow to the adjacent Palo Verde Mesa Groundwater Basin.

It is anticipated that groundwater extraction during construction (~616 to 1,368 afy) and operation (~1,605 afy) will not significantly impact the CVGB balance as the 1,368 afy during construction and the 1,605 afy during operations would not exceed the positive yearly balance of 2,608 afy.

Soil and Water Table 15
Estimated Change to Chuckwalla Valley Groundwater Basin Budget (Average Year Conditions)

Project Component	Years	Annual Basin Budget Balance	Project Requirements (afy)	Net Budget Balance (afy)
Construction	1	2,608	1,368	1,240
	2	2,608	616	1,992
	3	2,608	616	1,992
Operations	4-33	2,608	1,605	1,003
Note: See **Soil and Water Table 8** for Groundwater Basin Budget				

The project's pumping could also have an effect on the adjacent Palo Verde Mesa Groundwater Basin by inducing flows from the Colorado River. Given the location of the Project and the anticipated annual Project water requirements, staff anticipates that the project may have a significant impact on the adjacent (Palo Verde Mesa) groundwater basin. We note that future water use in the CVGB may be governed by impending regulations being formulated by the USBR. These are discussed in the section addressing LORS, below.

The Project applicant did not provide an analysis of the proportion of water originating from storage, from natural recharge and/or the Colorado River underflow. However, water in the Colorado River is fully appropriated and according to a 2006 U.S. Supreme Court Decision issued in Arizona v. California (2006) 547 U.S. 150, 126 S.Ct. 1543 "[c]onsumptive use from the mainstream [of the Colorado River] within a State shall include all consumptive uses of water of the mainstream, including water drawn from the mainstream by underground pumping." The mainstream was indicated as "the mainstream of the Colorado River downstream from Lee's Ferry within the United States, including the reservoirs thereon." The Supreme Court went on to state that the State of California is enjoined "from diverting or purporting to authorize the diversion of water from the mainstream the diversion of which has not been authorized by the United States for use in the respective States; provided, however, that no party named in this Article and no other user of water in said States shall divert or purport to authorize the diversion of water from the mainstream the diversion of which has not been authorized by the United States for its particular use."

The U.S. Geological Survey (USGS) has indicated that the PVMGB and the CVGB lie within a basin tributary to the Colorado River and that wells drawing groundwater within those groundwater basins could be considered to be withdrawing water from the Colorado River Aquifer (Wilson et al., 1994). Consequently, the Project has the potential

to indirectly divert Colorado River water without any entitlement to the water, and all groundwater production at the site could be considered Colorado River water. The Project owner will be required to implement Condition of Certification **SOIL&WATER-15** to replace the quantity of water contributed by the Colorado River from the Project's proposed groundwater extraction.

Condition of Certification **SOIL&WATER-15** requires development of a Water Supply Plan that includes water conservation projects such as use of ZLD systems, payment for irrigation improvements in Palo Verde Irrigation District purchase of water rights within the Colorado River Basin that will be held in reserve, and/or participation in BLM's Tamarisk Removal Program. To support the fact that water conservation measures are available, an example of a Tamarisk Removal Program is provided below:

The purpose of a Tamarisk Removal Program is to provide for an additional mechanism to mitigate for potential impacts to groundwater supply as a result of water use by the Project. This component not only provides benefits to the groundwater system (and replacement of Colorado River water), but also provides a substantial biological benefit by the removal of an invasive species that out-competes native vegetation and alters the natural desert ecosystem functions and values by converting the habitats into monocultures void of the diversity that supports native flora and fauna populations.

Tamarisk (salt cedar) is native to southwestern Asia and was introduced to the United States in the early 1800's for wind breaks. In the western United States, tamarisk is a highly invasive weed that has taken hold in semi-arid and arid watersheds in recent decades (de Gouvenain, 1996). Tamarisk can consume up to 250 gallons of ground water per day per mature tree (Department of Ecology, 2009).

A Tamarisk Removal Program has the potential to conserve a substantial amount of groundwater consumption within the Lower Colorado River area by removing a high water demand habitat that also monopolizes resources and negatively impacts native habitats in the area. A summary of water consumption estimates based on two scenarios is provided in **Soil and Water Tables-16** and **-17**.

Soil and Water Table 16
Water Savings Assuming Mature Trees

VARIABLE		CALCULATIONS	
27	acres		
250	gallons/tree/day	Trees/Acre	217.8
200	sf/tree	Trees Removed	5,881
43560	sf/acre	Gallons/Day	1,470,150
365	days/year	Gallons/Year	536,604,750
325,851	gal/acre-foot	**Acre-feet/Year Savings**	**1,647**

Soil and Water Table 17
Water Savings Assuming a Mixture of Mature and Immature Trees

VARIABLES		CALCULATIONS	
33	acres		
100	gallons/tree/day	Trees/Acre	435.6
100	sf/tree	Trees Removed	14,375
43560	sf/acre	Gallons/Day	1,437,4800
365	days/year	Gallons/Year	524,680,200
		Acre-feet/Year	
325,851	gal/acre-	**Savings**	**1,610**

According to the Lower Colorado River Multi-Species Conservation Program – Final Biological Assessment (2004), the extent of land cover associated with salt cedar (Tamarisk) is over 26,000 acres in the area surrounding the Palo Verde Valley (referred to as Reach 4 of the Lower Colorado River). A Tamarisk Removal Program would only be required to remove 27 acres of mature trees or 33 acres of a mixture of mature/immature trees to achieve a water savings of over 1,600 acre-feet per year. Correspondingly, there is more than sufficient salt cedar land cover type for the Project owner to implement a water conservation mitigation program using tamarisk removal.

Program implementation, maintenance, and monitoring could be funded through an Endowment Fund established by the Project owner. The fund could be held and managed by the BLM and/or Resource Conservation District based on resources and mechanisms available. The BLM and Resource Conservation District would use the fund to facilitate and manage implementation of the program.

With respect to the quantity of water that must be replaced, staff understands that the quantity of water stipulated in Condition of Certification **SOIL&WATER-15** is based on a simplified methodology for calculating contribution of water from the Colorado River from the Project's proposed groundwater extraction. The Project applicant could choose to implement **SOIL&WATER-19** Condition of Certification specified in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below and conduct a refined analysis of the quantity of water contributed by the Colorado River from Project groundwater extraction. This analysis may be used to revise the volume of water that must be replaced in accordance with Condition of Certification **SOIL&WATER-15.** We also note that future water use in the CVGB and PVMGB may be governed by impending regulations being formulated by the USBR. These are discussed in the section addressing LORS, below (Section C.9.9.1).

Groundwater Levels

The project has the potential to lower groundwater levels as a result of water production during both construction and operations. The lowering of groundwater levels could have a significant impact if the lowering of the groundwater levels: 1) impacts existing water wells in the basin; 2) lowers the water table in areas where deep-rooted phreatophytes are prevalent (see Section C.2 for impacts related to biological resources, 3) affects surface water features including springs and/or 4) induces permanent ground subsidence.

Drawdown imposed by a well on another nearby pumping well can have adverse affects on the performance of that well and is referred to as interference drawdown or well interference. Specific potential adverse affects evaluated in this study include the following:

1. Interference drawdown can result in the water level of an aquifer being drawn down below the screen of the well (i.e., the well goes dry);

2. Interference drawdown can result in the water level of an aquifer being drawn down to a point where the affected well's capacity to pump water is decreased and the well can no longer produce the amount of water that is needed for a particular use, or the well is at risk of becoming damaged and unusable over time due to exposure of the well's screen above the water table and resulting corrosion;

3. Interference drawdown can result in the water level in the affected well being drawn down to near the intake of the well's pump, requiring lowering of the pump intake in order for the well to remain operational; and/or

4. Interference drawdown can cause a decrease in groundwater level in the affected well such that the well and pump can continue to operate and produce adequate amounts of water, but pumping must occur at either greater frequency or duration, and/or water must be lifted to a greater height, resulting in greater operational and maintenance costs.

The extent and type of well interference experienced by an affected well is dependant on hydrogeologic conditions in the aquifer as well as the characteristics of the affected well. These include the following:

- The amount of interference drawdown that is applied (which varies with the distance of the impacted well from the Project well(s);
- The depth and screened interval of the affected well;
- The thickness of saturated sediments penetrated by the affected well;
- Local variations in the transmissivity of the saturated sediments in which the affected well is completed, if any;
- The condition and efficiency of the affected well;
- The affected well's pump specifications, including its rating curve, the depth at which the pump intake is set, and the resulting pumping water level in the well during operation; and
- The minimum required water production rate of the well.

Phreatophyte trees such as Mesquite, Ironwood or Palo Verde have deep root systems that can extend tens of feet below the ground surface to the underlying water table. In addition, wet playas can harbor halophyte plant communities that depend on a shallow water table for their moisture. Lowering of the water table below the root depth of these plants could result in stress or death. If this impact affects sensitive species, it is significant and requires mitigation. There is additional discussion of this issue in the Biological Resources section of this RSA.

Ground subsidence can occur as a result of water level decline in aquifer systems. When the fluid pressure in an aquifer is reduced as a result of changes in the groundwater level, a shift in the balance of support for the overlying materials causes the “skeleton” of the aquifer system to deform slightly. Reversible deformation occurs in all aquifer systems as a result of the cyclical rise and fall of groundwater levels associated with short and longer term climatic cycles. Permanent ground subsidence can occur when pore water pressures in the aquifer fall below their lowest historical point, and the particles in the aquifer skeleton are permanently rearranged and compressed. Soils particularly susceptible to such consolidation and subsidence include compressible clays in a confined aquifer system. This type of deformation is most prevalent when confined alluvial aquifer systems are overdrafted.

Construction and Operation

Preliminary investigations conducted at the Project site suggest that the aquifer proposed for development is under confined to semi-confined conditions and is separated in part from the shallow alluvial groundwater system by low permeability sediments. For purposes of analysis of impacts to water levels, a numerical model was developed by Worley-Parsons (WPAR, 2010) that separated the impacts between two water-bearing zones, the shallow alluvial zone (referred to as Layer 1), and the deeper Bouse Formation (referred to as Layer 11 and Layer 12). Correspondingly, impacts to these layers varied due to the assumption that the confining layers are laterally continuous and maintain hydraulic separation away from the proposed pumping wells.

The maximum predicted water table (Layer 1) drawdown associated with the Project is approximately 0.3 feet in the area of the pumping well, and the area where drawdown exceeds 0.25 foot is limited to within approximately 2.5 to 3.5 miles of the Project wells (see **Soil and Water Figure 16**). The maximum predicted drawdown in the Bouse Formation (Layer 12) associated with the Project is approximately 10 feet in the area of the pumping well, and the area where drawdown exceeds 1 foot is limited to within approximately 7 to 10 miles of the Project wells (see **Soil and Water Figure 17**).

Based on the general geology of the Chuckwalla Valley, the Riverside County General Plan Safety Element designates basin fill sediments in the valley as being susceptible to subsidence (Riverside County, 2008). However, the Project applicant (2009a) indicated in the AFC that during a recent period when groundwater demand was at a maximum and estimated to exceed 48,000 afy, the valley did not experience any subsidence. The applicant’s supposition that no subsidence will be caused by the project is based upon historical response of the CVGB to groundwater level declines that took place in the western portion of the basin and may not be applicable beneath the Project located in the eastern portion of CVGB. The potential for significant subsidence associated with the pumping of groundwater for the Project is considered low. However, due to the uncertainty related to conditions at the Project site, staff recommends that a monitoring program be implemented to assess long term changes that may occur as a result of groundwater pumping in the area. The Project owner will be required to implement **SOIL&WATER-17** to monitor and mitigate any potential impacts associated with ground subsidence associated with groundwater pumping.

The nearest potential wetland or halophyte communities are near Palen Lake. BLM has identified an ironwood woodland community approximately 5 miles north of the Project site. Predicted water table drawdowns beneath this woodland are in the range of 0.05 to 0.2 feet. Section C.2, Biological Resources describes potential impacts to vegetation that may be dependent on shallow groundwater table conditions.

Given the current understanding of the hydrogeology of the Quaternary Alluvium, the Bouse Formation and the Fanglomerate, as well as the current understanding concerning existing wells that may be affected by Project-induced drawdown, it is unlikely that groundwater pumping for the Project would cause any nearby wells to go dry or be severely impaired or rendered unusable by declining groundwater levels. Staff has proposed Conditions of certification to ensure that any significant impacts that do occur are mitigated.

Mitigation

Groundwater levels near the Project's water supply wells will decline during the Project pumping. Local decline of groundwater levels within the cone of depression could affect nearby wells. While preliminary studies and calculations have been made to assess the potential for impact, the quantification of the impact is considered an estimation and will not be able to be accurately quantified until actual long-term groundwater production occurs. Implementation of Conditions of Certification **SOIL&WATER-2** through **SOIL&WATER-5**, provided in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, are expected to minimize impacts to groundwater levels below the level of significance.

The applicant will be required to implement Condition of Certification **SOIL&WATER-17** that requires a Subsidence Monitoring and Action Plan to assess and mitigate potential effects of non-elastic subsidence associated with groundwater extraction in the vicinity of the proposed production wells.

Mitigation for potential impacts to groundwater-dependent vegetations is discussed in the Biological Resources section of this RSA.

<u>Groundwater Quality</u>

Construction and Operation

There is a potential that significant groundwater quality impacts could occur during construction if contaminated or hazardous materials used during construction were to be released and migrate to the groundwater table. Given the distance to the groundwater table (70-90 feet bgs) and the proposed implementation of a hazardous material management plan during construction (see Section C.4, Hazardous Materials Management), staff expects impacts to groundwater quality to be below the level of significance.

There is a potential that Project extraction of groundwater may induce vertical flow of high saline groundwater from beneath Ford Dry Lake to lower aquifers being used for water production located beneath the site. Slight lateral transport of high TDS groundwater may occur as a result of the project and the vertical transport of high saline

groundwater downward may slightly increase TDS concentrations in some limited areas. Under State Water Resources Control Board (SWRCB) Resolution 88-63, the brackish water underlying the Project site that exceeds TDS concentrations of 3,000 mg/L or 250 mg/L chloride would not be considered a potential source of drinking water; and would be suitable only for potential industrial use.

The impact upon water quality due to project pumping was completed by simulating transport of chloride in groundwater using the MT3D transport model. Groundwater velocity data output from the groundwater flow model impact assessment was utilized by the MT3D transport model for this assessment. Chloride was selected as the preferred solute, as it is conservative (e.g. does not undergo chemical reactions or attenuation) and is a dominant anion in groundwater in the Project area for which significant baseline analytical data is available for the lower aquifers being used for water production. In addition, chloride can be directly related to TDS concentration with a reasonable degree of accuracy. Chloride concentrations in groundwater in the eastern portion of the basin are approximately 38 percent of the TDS concentration (WPAR, 2010a).

The water quality impact model was run for a period of 33 years to simulate the expected duration of project operations and the modeled concentrations of chloride in groundwater extracted from the well were recorded. Chloride in the model will migrate with the groundwater that is being extracted, and increases in chloride concentrations imply vertical or lateral migration of high chloride, and hence high TDS groundwater into lower concentration areas, thus potentially degrading water quality (WPAR, 2010a).

During the 33-year pumping simulation, chloride concentrations are projected to decrease slightly, from a baseline concentration of approximately 1,600 mg/L to approximately 1,470 mg/L at the end of the simulation. This is a decrease of approximately 8 percent and is likely due to the dilution of groundwater in the project area by lower TDS groundwater drawn in from the north and east of the Project site.

However, due to the uncertainty associated with the amount of information available concerning shallow groundwater quality, continuity of confining layers and on vertical migration, implementation of Conditions of Certification **SOIL&WATER-3** through **SOIL&WATER-5** and **SOIL&WATER -20**, provided in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, are expected to minimize impacts to groundwater quality below the level of significance.

With regard to the operation of the Land Treatment Unit (LTU) on the project site, the material that will be placed in the LTU consists of soil that is contaminated with Therminol® VP1 HTF as a result of minor leaks or spills (see Section C.4 Hazardous Materials Management) that occur during the course of daily operational or maintenance activities. The LTU will cover an area of approximately 600 feet by 725 feet, including the staging area, and will cater to both 125 MW units. The LTU will be constructed with a prepared base consisting of two feet of compacted, low permeability, lime treated material and be surrounded on all sides by a minimum two foot high compacted earthen berm with slopes of approximately 3:1 (horizontal:vertical) that will serve as a protective barrier to the downward movement of contaminants from the LTU.

Moreover, should any contaminants escape the LTU, the water table is approximately 70-90 feet beneath the LTU.

At ambient temperatures, HTF is a highly viscous material (crystallizes at ~54°F) that is virtually insoluble in water (solubility of ~25 mg/L [WPAR, 2009]). Operation of an LTU is not expected to impact surface water or groundwater quality beneath the site. The LTU will be surrounded on all four sides by berms that will protect the LTU from surface water flow. Because of the viscous and insoluble nature of HTF, it is not likely to mobilize from the soil downwards to the water table (approximately 70-90 feet bgs). In addition, the Project owner will be required to implement Condition of Certification **SOIL&WATER-6** that sets forth specific waste discharge requirements that detail construction performance standards, expected operational requirements of the LTU, groundwater and leak detection monitoring requirements and action requirements associated with the operation of the LTU. Compliance with the requirements of CCR Title 23, Division 3, Chapter 15 and Title 27, Section 2000 et seq. and Title 23, Section 2510 et seq and Condition of Certification **SOIL&WATER-6** would minimize potential impacts to groundwater quality to below the level of significance.

In summary, because of the viscosity of HTF at ambient temperatures, the insolubility of HTF, the depth of the water table, and the placement of protective berms around the LTU, and the waste discharge requirements set forth in Condition of Certification **SOIL&WATER-6,** it is expected that surface water and groundwater quality beneath the site will not be impacted by LTU operation.

Each 125 MW unit will have three double-lined evaporation ponds. Each pond will have a nominal surface area of eight acres resulting in a total of 24 acres of evaporation ponds for each unit or a total of 48 acres of ponds for both 125 MW units. The ponds will be designed and permitted as Class II Surface Impoundments in accordance with CRBWQCB requirements, as well as the requirements of the California Integrated Waste Management Board (CIWMB). Multiple ponds are planned to allow plant operations to continue in the event that a pond needs to be taken out of service for some reason, *e.g.,* needed maintenance. Each pond will have enough surface area so the evaporation rate exceeds the cooling tower blowdown rate at maximum design conditions and annual average conditions.

The average pond depth is eight feet and residual precipitated solids will be removed approximately every seven years to maintain a solids-depth no greater than approximately three feet for operational and safety purposes. The precipitated solids will be sampled and analyzed to meet the characterization requirements of the receiving disposal facility. The characteristics of the precipitated solids will determine the transportation and disposal methodology. It is anticipated the pond solids and other non-hazardous wastes would be classified as Class II Designated Waste, a non-hazardous industrial waste. Genesis Solar, LLC will test the pond solids using appropriate test methods in advance of removal from the evaporation ponds to confirm this determination; however, preliminary data estimates show the material will be non-hazardous. Approximately 7,150 tons of evaporative residue will be accumulated yearly, which equates to approximately 50,000 tons of evaporative residue being removed during each cleanout and a total estimated amount of 214,500 tons over 30 years.

The pond liner system will consist of a 60 mil high density polyethylene (HDPE) primary liner and a secondary 40 mil HDPE liner. Between the liners is a synthetic drainage geonet and collection piping that is used as part of the leachate collection and removal system (LCRS), which will be directed back to the pond. There will be a hard surface protective layer on top of the 60 mil HPDE which will consist of a non-woven geotextile, a one foot thick granular fill/free draining material, and a one foot thick hard surface such as roller-compacted concrete. The hard surface provides protection against accidental damage to the HDPE from falling objects, varying climatic conditions, and worker activities during cleanout and maintenance. Monitoring of the evaporation ponds will be required to detect the presence of liquid and/or constituents of concern. Based on the experience of the existing SEGS plants, it is expected the constituents of concern for this monitoring will include chloride, sodium, sulfate, TDS, biphenyl, diphenyl oxide, potassium, selenium, and phosphate. The Project owner will be required to implement Condition of Certification **SOIL&WATER-6** that sets forth specific waste discharge requirements that detail construction performance standards, expected operational requirements of the surface impoundments, groundwater and leak detection monitoring requirements and action requirements associated with the operation of the surface impoundments. Due to the aforementioned construction and operational procedures of the surface impoundments (see Condition of Certification **SOIL&WATER-6** and Appendix B, C, and D) along with Condition of Certification **SOIL&WATER-20**, groundwater quality is not anticipated to be affected as a result of disposal of this waste stream and impacts to groundwater quality would be below the level of significance.

The use and application of septic fields is an established practice as a method of wastewater treatment. The closest septic field to a privately owned parcel of land is in excess of ½ mile. The septic system will have no effect on the surface water in or around the Project site. The septic system will be installed approximately 5-6 feet deep. In addition, the Riverside County Department of Environmental Health has a Technical Guidance manual for Onsite Wastewater Treatment Systems and this requires a setback of 100 feet between this type of system and the nearest groundwater well.
It is assumed that individual septic systems and leach fields are planned for each of the two power blocks in support of the Project's administrative, warehouse, and control room and facilities. The proposed septic systems and leach fields for the various facilities are hydraulically up-gradient approximately 3 miles from the nearest offsite well. Therefore, operation of the septic systems and leach fields from these areas are not expected to impact groundwater quality at the nearest offsite wells.

The septic system and leach fields for the Project will be constructed in accordance with the requirements of Riverside County and Condition of Certification **SOIL&WATER-7**:

1. Ordinance 650.5 (amending Ordinance 650, which regulates the discharge of sewage in unincorporated areas of the County of Riverside and incorporates by reference Ordinance 725),

2. Title 15 Section 15.24.010 (the Uniform Plumbing Code) Appendix K for Private Sewage Disposal – General and Disposal Fields, and

3. Title 8 Section 8.124.030 (Approval and Construction Permit for Sewage Discharge) and Section 8.124.050 (Operation Permit for Sewage Disposal).

Soil and Water Table 18 lists septic system and leach field minimum setbacks as required by the County of Riverside and the Project setbacks for the Project site.

Soil and Water Table 18
Sanitary Facility Set-Backs Requirements

County of Riverside Requirement	Minimum Set Back	Project Set Back	Reference
Minimum Distance Between Groundwater and Leach Lines	5 feet	175 feet	Riverside County Ordinance 650.5 (& OWTS Guidance Manual)
Minimum Horizontal Distance From Water Supply Wells	50 feet	250 feet	2007 California Plumbing Code (adopted by Reference as Riverside County Title 15, Chapter 15)

Source: Derived from AECOM (2009) and WPAR, 2010a..

Mitigation

Groundwater quality in the vicinity of the project site could be impacted as a result of the operation of the LTU, surface impoundments and septic fields. Preliminary studies and calculations have been made to assess the potential for impact. These studies suggest that there is a low potential to impact groundwater quality in the vicinity of the project site. Due to the uncertainty associated with the potential to impact groundwater quality and the regulatory requirements for operation of the LTU, surface impoundments as well as stormwater and potentially septic system operations, staff recommends implementation of specific monitoring and mitigation requirements.

Implementation of Conditions of Certification **SOIL&WATER-6** and **SOIL&WATER-7** and **SOIL&WATER-20** are anticipated to minimize impacts below a level of significance. These measures are provided in detail in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below.

Surface Water Hydrology

The impacts of the Project on the local surface water hydrology are directly related to proposed onsite grading and the construction and operation of a network of engineered collector/conveyance channels designed for the purpose of protecting the Project from flooding and erosion related to the conveyance of runoff from offsite watersheds across the project. Onsite runoff will be controlled through appropriate grading and a network of engineered channels designed to collect and convey flow through the project for discharge offsite. The Project will change both the extent and physical characteristics of the existing floodplain within the Project site and downstream of the Project site. A change in sediment transport and depositional characteristics at and downstream of the Project site will also occur.

The Concept Drainage Study (GSEP 2009a) provides a summary of discharges at the downstream property boundary which compares existing total outflow at the project boundary with post-development outflows at the project boundary. The post-development discharges from the Project watersheds are significantly higher than existing conditions as shown on **Soil and Water Table 19.** This is to be expected given the change to surface conditions, including soil compaction and a more efficient drainage system. The study indicates that the increase in discharge is to be mitigated

by the use of detention basins located at each of the solar fields. These basins would be sized and designed to operate in a manner as to reduce the post-development discharges to pre-development conditions.

The use of detention basins can be of concern as they tend to allow for the deposition of sediment leaving the discharged flow in a sediment deficient condition. This situation can favor downstream erosion as the more concentrated flows balance their sediment load. The Conceptual Grading Plans (GSEP 2010a) for the project do provide for erosion control downstream of the outlet in the form of an engineered energy dissipater and downstream riprap splashpad comprised of 6" rock. The proposed splashpad is not compatible with the wildlife traversability requirements for the project and the design will need to be modified during the formal construction plan process. The velocity and depth of flow off of the energy dissipater structure will need to be reviewed within the context of allowable non-erosive velocities based on site specific soil conditions.

Soil and Water Table 19
Summary of Existing and Proposed Peak Flow Rates at Downstream Project Boundary

Sub-basin ID	Existing Q_{100}	Developed Q_{100}
1	4070	1156
2	2203	4086
3	10,022	2006
A (onsite)	519	1295
B (onsite)	419	1127

Engineered drainage channels will be constructed along the project boundary wherever the potential for the interception of offsite surface flows exists. These channels will intercept offsite flows and convey them around and through the project for discharge along the southern project boundary. Onsite flows would be discharged directly into detention basins via a series of smaller internal swales and channels. The conceptual layout of the drainage system is provided on **Soil and Water Figure 18** as well as on Sheets 1 through 7 of the Conceptual Grading Plans (GSEP 2010a). Discharge of flow along the downstream project boundary would be through the use flow dispersion structures in the form of pipes and weirs. The intent of these structures is to reduce flow velocities and allow flow to be released/spread out in a manner that mimics existing sheet flow conditions downstream of the project.

Releasing flow back to native ground in a manner similar to existing conditions is of concern for two primary reasons. The first is that flow collected from a large area and discharged in a more concentrated area may result in the potential for increased erosion. The second potential concern is that the significant change in flow patterns may essentially "dry-up" discreet areas downstream of the project potentially resulting in a significant impact to the existing biological resources beyond the project boundary. This issue is discussed further in Section C.2 – Biological Resources.

Alteration of Drainage Patterns

Construction and Operation

Onsite Drainage

All existing washes and floodplains within the Project boundary will be completely eliminated by the grading of approximately 1,800 acres to provide the flat, uniform and vegetation-free topography required for the construction and operation of the solar mirror array. The existing natural drainage system will be replaced with a system of constructed swales and channels designed to collect and convey onsite flows to designated points of discharge from the project. Onsite stormwater from the Project will be discharged offsite through constructed detention basins which will provide for attenuation of increased discharges due to site development. The impact to onsite drainage patterns will be significant.

Offsite Drainage

The Project will not impact the existing natural drainage system upstream of the Project boundary as there are no plans for any diversions, basins, dams or other surface water controls beyond the upstream limits of the Project. However, there is the potential for erosion of offsite areas upstream due to the formation of headcuts which could migrate laterally from the engineered channels if they are not stabilized and protected.

Physical modifications to the natural drainage system downstream of the Project boundary are not proposed. However, there will be changes to both the existing drainage patterns and sediment transport characteristics as the result of the concentration and diversion of flows upstream of the project, and the subsequent release of those flows at discreet locations on the downstream side of the project. Certain downstream areas will receive more flow than under existing conditions, while other areas may no longer receive any surface flow beyond what may be the result of direct precipitation. The release of concentrated flows at the proposed dispersion structures may have the potential for increased erosion.

The assessment of the impacts to the existing surface flow patterns requires a detailed analysis utilizing FLO-2D or a similar model to clearly delineate the pre- and post-project conditions. Information obtained from such an analysis is critical to assess the extent and adequacy of the proposed flood control measures on the northern eastern project boundaries as well as along the downstream project boundary where flow is released from the engineered channels onto existing ground. The applicant completed FLO-2D modeling for existing conditions and provided the results of that analysis in a Technical Memorandum. The modeling confirmed extensive sheet flow conditions along the entire upstream project boundary. The applicant also provided preliminary FLO-2D modeling for proposed conditions to demonstrate how flow will be released from the downstream project boundary back onto native ground. A conceptual diagram showing flow patterns downstream of the project site is provided on **Soil and Water Figure 19.** The design for the outlet structures from the downstream engineered channel will allow for flexibility for where flow is released and how much is released at discreet locations.

Mitigation

Implementation of Condition of Certification **SOIL&WATER-10** and **SOIL&WATER-11**, (described in detail in Section C.9.12, *Proposed Conditions of Certification/ Mitigation Measures,* below) is anticipated to minimize impacts related to surface drainage associated with construction and operation of the Project to below the level of significance. These conditions provide specific guidance and requirements for channel and erosion protection design that will minimize erosion resulting from flow within and into the channel for the adjacent floodplain. Implementation of Conditions of Certification **SOIL&WATER-8** and **SOIL&WATER-9** will ensure that adequate studies and data are provided to assess the that **SOIL&WATER-10** and **SOIL&WATER-11** have been implemented within the context of site specific conditions. These conditions provide specific requirements for the content of the drainage analysis and report, as well as FLO-2D modeling that will support and document the project design.

Flood Hazards

Construction

The Project will be protected from flooding from offsite sources through the construction of engineered channels along upstream project boundaries. These channels will capture and convey up to the 100-year flow through and around the Project and discharge it along the southern project boundary. The Concept Drainage Study (GSEP 2009a) and Conceptual Grading Plans (GSEP 2010a) for the project provide information on the layout and geometry of the proposed channels as well as the design discharges for each reach. Cross-sections for each channel were also provided which show how the channels will tie into existing grade and into the proposed facility. Given the extremely flat nature of the site, there do not appear to be any major grading related issues that would favor erosion, such as large cut slopes to accommodate a terraced project design. Channel profiles and flow analyses to determine flow depth and velocity were not provided in support of this impact analysis. In general, the preliminary plans were incomplete with regard to fully providing a sound drainage concept.

A summary of the proposed channel geometry and hydraulic characteristics as provided in the Concept Drainage Study (GSEP 2009a) and Conceptual Grading Plans (GSEP 2010a) is provided in **Soil and Water Table 20**. Hydraulic data were not provided for the 10-year flow, which is usually used to demonstrate reasonable channel velocities. However, the 100-year hydraulic data does indicate that most channel reaches do meet, or likely meet, established and reasonable guidelines for allowable channel velocities. Special consideration will need to be given in those sections that do not meet these guidelines for the 10-year flow event.

Soil and Water Table 20
Summary of Proposed Collector and Conveyance Channel Hydraulic Characteristics

Channel ID	Design Discharge (cfs)	Approximate Length (ft)	Bottom Width (ft)	Channel Depth (ft)	Side Slopes (H:V)	100-Year Velocity Range (feet per second)
A	1,156	7,500	20'-43'	3' to 4'	3:1	4.5 to 5.1
B	4,086	8,000	31'-150'	3' to 4'	3:1	5.6 to 9.6
C	2,006	3,800	20' to 45'	3' to 4'	3:1	3.0 to 3.7
B/C	,6092	5,000	150' to 156'	4' to 5'	3:1	5.7 to 7.2
D	2,600	7,500	24' to 91'	3' to 6'	3:1	5.5 to 9.6
E	254	1,300	20'	3'	3:1	3.2 to 8.6
D/E	2,854	3,500	95'	5'	3:1	5.7

The Conceptual Grading Plan provided in the DESCP (GSEP 2009a) provides typical channel sections for the proposed collector and conveyance channels. These details show fully armored slopes utilizing gabions or riprap. These materials are not consistent with project requirements for traversability by wildlife and should not be utilized. Soil cement is the preferred method of channel stabilization. The typical sections in the Conceptual Grading Plan (GSEP 2009a) show 3:1 slopes are predominate for the larger channels. Experience has shown that anything steeper than approximately a 4:1 slope is impractical for a "slope paving" type of construction. At steeper slopes, the soil cement is difficult to place and compact within industry accepted specifications, especially in channels which are more than a few feet deep. The other option is to construct the soil cement in lifts which significantly increases material quantities and most likely construction time.

Protection of the facility from flooding and erosion related to onsite runoff will be accomplished through appropriate grading and the construction of engineered swales and channels. The Conceptual Grading Plan provided in the DESCP (GSEP 2009a) indicates finished grades within the solar array of less than 0.3 percent. The relatively flat slopes and grading will prevent runoff from concentrating, resulting in shallow sheet flow which will minimize the potential for surface erosion and sediment transport. Drainage channels will be placed at within the facility to collect and convey onsite flows. These channels will be constructed at a slope of approximately 0.40 percent which should result in non-erosive velocities. Collector channels will discharge into detention basins which will subsequently discharge offsite at the property boundary. The Concept Drainage Study (GSEP 2009a) did not provide a well developed onsite drainage plan with regards to peak discharges at specific locations and the resultant channel flow velocities. It is also assumed that additional smaller swales will be required to convey smaller flow to the larger collector channels. However, the proposed drainage plan when completed and implemented consistent with the requirements of Condition of Certification **SOIL&WATER-**8 through **SOIL&WATER-11**, and **SOIL&WATER-13**, would adequately protect the facility from significant damage due to flooding and erosion associated with events up to the 100-year discharge as defined in the approved project Drainage Report. These conditions provide specific requirements for flow velocities and bank protection that will minimize channel erosion, as well as require studies and analysis to verify and document the appropriateness of the drainage design.

Operation

During operation, the proposed collector and conveyance channel along the west project boundary will be exposed to incoming side flows along most of its extent. These inflows could include concentrated runoff at the more defined drainages, shallow sheet flow, and smaller more localized flows. All of these elements have the ability to cause significant erosion of unprotected channel banks as well as to create headcutting which will extend roughly perpendicular from the outer channel bank into the adjacent floodplain. These headcut features have the potential to achieve the same depth as the main collector channel and can extend upstream for several hundred feet over time due to numerous smaller flow events, or can occur very quickly from a single large event depending on the magnitude of flow at a given location. Significant impacts to areas beyond the project boundaries can occur due to these erosional features. Appropriate bank stabilization measures must be implemented to ensure that headcutting is prevented at all locations where flow enters the engineered channels.

Operation of the proposed channels and erosion mitigation measures will require significant inspection and maintenance over the life of the facility to ensure that the channels are operating as intended and that potential and observed erosion issues are addressed promptly to minimize damage to the facility and areas beyond the Project boundary. Relatively small problems and erosional features which develop during smaller more frequent event can become the focal point for problems during larger events. The applicant has prepared a Draft Channel Maintenance Plan which addresses some of the potential issues associated with long term operation of the channels. However, the plan does not adequately address the issue of the collection of offsite flows or the use of soil cement along areas subject to inflows from offsite watersheds. The monitoring and mitigation of erosion to offsite areas caused by the presence and operation of the proposed collector and conveyance channels must be explicitly addressed in the document. The requirement for adequate channel erosion protection is addressed in Condition of Certification **SOIL&WATER-11**. This condition provides specific requirements for where and under what conditions channel protection must be provided, ensuring that the potential for channel erosion is eliminated or minimized.

Channel Maintenance Program

The applicant shall develop and implement a Channel Maintenance Program that provides a framework for routine channel maintenance projects and ensures compliance with conditions of certification in a feasible and environmentally-sensitive manner. The Channel Maintenance Program would be a process document prepared by the Project owner, which would be reviewed and approved by the CPM. Staff is requiring as part of Condition of Certification **SOIL&WATER-13** that the Channel Maintenance Program provide long-term guidance for the implementation of routine channel maintenance projects and comply with Project's related biological (see Section C.2, Biological Resources) and flood protection (**SOIL&WATER-1** and **SOIL&WATER-11**) conditions of certification. Condition of Certification **SOIL&WATER-13** requires that the applicant will implement the measures identified in the program. The main goals of the Channel Maintenance Program would be to maintain the diversion channels to meet its original design to provide flood protection, protect offsite areas form erosion, support Project mitigation, protect wildlife habitat and movement/migration, and maintain

groundwater recharge. Compliance with Condition of Certification **SOIL&WATER-13** would reduce the impacts below the level of significance.

Mitigation

Implementation of Conditions of Certification **SOIL&WATER-9** through **SOIL&WATER-11**, and **SOIL&WATER-13** described in detail in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, is anticipated to minimize impacts related to flood hazards and erosion associated with construction and operation of the Project to below the level of significance. They will also provide the basic information to assist the CPM to adequately review and assess the appropriateness of the proposed design within the context of the site specific conditions.

Surface Water Quality

Project storm water may encounter soil or chemicals deleterious to aquatic and terrestrial plant and wildlife. The Project applicant proposes to implement BMPs for managing potentially harmful storm water and protect water quality. Potentially significant water quality impacts could occur during operations if contaminated or hazardous materials used during operations were to contact storm water and drain offsite. The Project would alter natural storm water drainages and use BMPs to reduce potentially significant impacts related to concentrated drainage and ensuing soil erosion and sediment transport offsite.

Construction

Potential threats to surface water quality related to construction on the project site as well as linear features and would include: potential increases in sediment loads to adjacent streams and washes; accidental spills of hydrocarbon fuels and greases associated with construction equipment. Potential increased sediment loads will be mitigated through development and implementation of a Drainage Erosion and Sedimentation Control Plan (DESCP) which is required as part of Conditions of Certification **SOIL&WATER-1.** Proper implementation of the DESCP ensures proper protection of water quality and soil resources, including provisions for sediment and stormwater retention from the power block, solar fields and transmission right of way.

Accidental spills of hydrocarbon fuels and greases associated with construction equipment will be mitigated by development and implementation of **HAZ-1 and HAZ-2** (found in Section C.4 Hazardous Materials Management) which includes development of a Spill Prevention, Control and Countermeasure (SPCC) Plan. The SPCC Plan sets forth spill prevention methods as well as actions to be taken in the event of an accidental spill or release of hazardous materials. In summary, implementation of Conditions of Certification **SOIL&WATER-1** (found in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below) and Conditions of Certification **HAZ-1 and HAZ-2** (found in Section C.4 Hazardous Materials Management) would reduce potential water quality impacts to insignificant.

Operation

Potential threats to surface water quality related to operations include: potential increases in sediment loads to adjacent washes; accidental spills of hydrocarbon fuels

and greases (including HTF fluid) associated with operations equipment, and accidental releases from HTF treatment area and the surface impoundments that includes wastewater from the pre-treatment and RO reject water.

A DESCP would be required (see Conditions of Certification **SOIL&WATER-1)** prior to onsite operations and will reduce the potential for increased sediment loads to less than significant. Potential spills will be managed through hazardous materials management (see Section C.4 Hazardous Materials Management and Conditions of Certification **HAZ-1** and **HAZ-2**). The operation of the surface impoundments will include 2 feet of freeboard to minimize the potential for overtopping during 100-year precipitation event. In addition, the LTU and surface impoundments would operate under the waste discharge requirements that include operational and leak detection monitoring as stipulated in **SOIL&WATER-6** and would reduce the potential for impacts to surface water quality to less than significant

Mitigation

Implementation of Condition of Certification **SOIL&WATER-1** and **SOIL&WATER-13** (described in detail in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below) and **HAZ-1** and **HAZ-2** (described in detail in Section C.4 Hazardous Materials Management), is anticipated to reduce impacts to surface water quality to below the level of significance associated with construction and operation of the Project. Additional requirements for mitigation of potential surface water quality impacts will also be included as a part of the waste discharge requirements for the LTU and surface impoundment that would be included in Condition of Certification **SOIL&WATER-6.**

C.9.4.3 CEQA LEVEL OF SIGNIFICANCE

Section 15064.7 of the CEQA Guidelines encourages each public agency to “develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects.” The section continues to define a significance threshold as being an “identifiable quantitative, qualitative, or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect will normally be determined to be less than significant.”

The Energy Commission, in its role as CEQA lead agency for the Project, has not developed or published significance thresholds related to soil and water resources. In the absence of Energy Commission-specified significance thresholds, the analysis of the significance of potential environmental effects related to soil and water resources contained herein is made based on the criteria specified in Appendix G of the CEQA Guidelines, as identified in Section C.9.3, Methodology and Thresholds for Determining Environmental Consequences, above.

C.9.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative (RAA) would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by the Project applicant. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts

are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.9.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.9.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Soil Erosion

Soil erosion at the RAA Project site could be impacted as a result of the construction and operation of the RAA Project. Impacts related to soil erosion from wind and surface water are anticipated to be similar to those associated with the proposed Project.

The RAA Project construction activities would disturb site soils at the site and along the linear facilities route(s). It is at the time of this disturbance that there would be the highest potential for erosion, as well as associated effects including soil loss and increased sediment yields downstream from disturbed areas. It is expected that BMPs would be utilized to minimize the impacts of soil erosion during construction to less than significant.

Geomorphology

The Reduced Acreage Alternative (shown in Appendix E-Figure 25) was assessed for its potential geomorphic impacts. The alternative removes the proposed eastern solar array from the project. Since the main geomorphic impacts identified in this report are associated with the eastern solar array this alternative would have lower impacts, with no impact on the Chuckwalla and Palen-McCoy sand corridors or on the eastern wash complex. No mitigation is required or proposed.

Groundwater Basin Balance

Groundwater basin balance in the vicinity of the RAA Project site could be impacted as a result of the construction and operational water use. The potential impact would be approximately 50 percent less than the proposed Project as the RAA uses approximately 50 percent less water than the proposed Project.

As previously stated, the Project has the potential to indirectly impact flow in the Colorado River by inducing underflow into the PVMGB. Implementation of the Condition of Certification **SOIL&WATER-15** specified in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, is anticipated to reduce the potential for impacts from water drawn from the Colorado River through groundwater pumping to below the level of significance.

Groundwater Levels

Groundwater levels in the vicinity of the RAA Project site could be impacted as a result of the construction and operational water use. The potential impact is expected to be approximately 50 percent less than the proposed Project as the RAA would use approximately 50 percent less water than the proposed Project.

Groundwater levels near the Project's water supply wells will decline during the Project pumping. Local decline of groundwater levels within the cone of depression could affect nearby wells. While preliminary studies and calculations have been made to assess the potential for impact, the quantification of the impact is considered an estimation and will not be able to be accurately quantified until actual long-term groundwater production occurs. Implementation of Conditions of Certification **SOIL&WATER-2** through **SOIL&WATER-4**, provided in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, are expected to minimize impacts to groundwater levels below the level of significance.

The applicant will be required to implement Condition of Certification **SOIL&WATER-17** that requires a Subsidence Monitoring and Action Plan to assess and mitigate potential effects of non-elastic subsidence associated with groundwater extraction in the vicinity of the proposed production wells.

Mitigation for potential impacts to groundwater-dependent vegetations is discussed in the Biological Resources section of this RSA.

Groundwater Quality

Groundwater quality in the vicinity of the RAA Project site could be impacted as a result of the operation of the LTU, surface impoundments, and septic fields. The potential impact would be similar as for the proposed Project. Implementation of Conditions of Certification **SOIL&WATER-4** through **SOIL&WATER-6** and **SOIL&WATER-20**, provided in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, are expected to minimize impacts to groundwater levels below the level of significance.

Surface Water Hydrology

The impacts and mitigation measures of the RAA Project would be similar to the proposed project, except proportionately smaller in scale with regards to overall natural area lost to mass grading. All existing washes within the smaller developed portion of the site would be eliminated by onsite grading and replaced with a system of engineered swales and channels. Mitigation of potential erosion and headcutting in the engineered channels would still be required as would a careful design along the downstream project boundary to ensure the diverted flows are released in a manner which does not increase offsite erosion. However, the overall volume of offsite flow that would need to be collected and conveyed around the project would be significantly less due to reduced footprint, and impacts to the floodplain downstream would also be proportionately reduced.

Surface Water Quality

Surface water quality in the vicinity of the RAA Project site could be impacted as a result of surface grading. In addition, potentially significant water quality impacts could occur during operations if contaminated or hazardous materials used during operations were to contact storm water and drain offsite. Moreover, the RAA would alter natural storm water drainages and significantly impact surface water quality.

C.9.5.3 CEQA LEVEL OF SIGNFICANCE

Section 15064.7 of the CEQA Guidelines encourages each public agency to "develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects." The section continues to define a significance threshold as being an "identifiable quantitative, qualitative, or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect will normally be determined to be less than significant."

The Energy Commission, in its role as CEQA lead agency for the Project, has not developed or published significance thresholds related to soil and water resources. In the absence of Energy Commission-specified significance thresholds, the analysis of the significance of potential environmental effects related to soil and water resources contained herein is made based on the criteria specified in Section C.9.3, Methodology and Thresholds for Determining Environmental Consequences, above.

C.9.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Project. It is assumed that the ACC system would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 fans would be required for each ACC for the two solar fields. The 18 fans would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The ACC described in the Project cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the ACCs up to 120 feet in height. In addition to the ACC and fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 802 acre-feet per year (afy) to 101 afy. This reduction in water use would reduce impacts to water and biological resources.

C.9.6.2 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.9.6.3 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Wet-cooling maximizes power plant fuel efficiency by providing a continuous source of effective cooling for the plant's steam condensers. Dry cooling will typically provide less effective cooling of the condensers, reducing the efficiency of the steam cycle portion of the power plant, and thus the overall fuel efficiency of the facility.

The FSA for the Beacon Solar Energy Project (08-AFC-2; BSEP 2009) showed that annual average fuel efficiency would be reduced 5-7 percent compared to a wet cooling system. The Project applicant stated that use of dry cooling would result in a 7.4 percent decrease in total annual net MWh compared with a wet cooling system (GSEP 2009a). In order to counter the reduction in generation that would result from dry cooling, the Beacon Solar Energy Project applicant proposed expanding the solar field by 12 percent.

The Project applicant states that the proposed project has been optimized for the land available, and therefore solar field expansion infeasible (GSEP 2009a). However, the power block and solar arrays would occupy approximately 1,360 acres of the 1,800-acre site. Evaporation ponds, access roads, administration buildings, and other support facilities would require a portion of the 1,800-acre site, and there is also remaining open space (GSEP 2009a). Additionally, use of dry-cooling would require smaller evaporation ponds opening up additional land for solar field expansion. A 12 percent increase in the solar field would require approximately an additional 150 acres. While it is uncertain whether the entire 150 acres is available for use and would comply with the engineering requirements for the Project, it is clear from the site plan that there is some available land immediately adjacent to existing solar trough rows and this land could be used to offset all or a portion of the efficiency loss due to the use of dry-cooling.

Soil Resources

Because the ACC system would not require any additional ground disturbance other than what would be required for the proposed Project with the use of wet-cooled towers, impacts to soil resources from use of the Dry-Cooling Alternative would be expected to be similar as for the proposed project. Erosion impacts would be expected to be similar; however, the ACC system would potentially require some increase in truck traffic and related erosion due to the larger size of the system.

Water Resources

The Dry Cooling Alternative would reduce operation use of water from 802 afy to approximately 101 afy per 125 MW power block (GSEP 2009f). The Dry Cooling Alternative would include a Wet Surface Air Cooler to provide auxiliary cooling during extremely hot days.

A comparison was made between the average annual basin budget balance with the anticipated project water production requirements. **Soil and Water Table 21** presents the anticipated projects water requirements along with the average annual basin budget balance for the 37-month construction period. Currently, the CVGB balance is positive by approximately 2,608 afy whereby inflow (approximately 13,719 afy) to the basin is slightly greater than estimated outflows (approximately 11,111 afy) to the basin. Approximately 400 afy is attributed to subsurface outflow to the adjacent Palo Verde Mesa Groundwater Basin.

It is anticipated that groundwater extraction during construction (~616 to 1,368 afy) and operation (~202 afy) would not significantly impact the CVGB balance as the 1,368 afy during construction and the 202 afy during operations would not exceed the positive yearly balance of 2,608 afy.

Soil and Water Table 21
Estimated Change to Chuckwalla Valley Groundwater Basin Budget
(Average Year Conditions)

Project Component	Years	Annual Basin Budget Balance	Project Requirements (afy)	Net Budget Balance (afy)
Construction	1	2,608	1,368	1,240
	2	2,608	616	1,992
	3	2,608	616	1,992
Operations	4-33	2,608	202	2,406
Note: See **Soil and Water Table 8** for Groundwater Basin Budget				

Construction and operation of the Project would have an impact on basin balance in the CVGB. The impacts are considered insignificant, due to the fact that project pumping does not exceed net average recharge to the basin. The project's pumping could also have an effect on the adjacent Palo Verde Mesa Groundwater Basin (PVMGB) by inducing flows from the Colorado River into the PVMGB and as such those effects could be significant. Given the location of the Project, the anticipated annual Project water requirements, staff anticipates that the project may have a significant impact on adjacent (Palo Verde Mesa) groundwater basin.

The Project applicant did not provide an analysis of the proportion of water originating from storage, from natural recharge and/or the Colorado River underflow. However, as previously stated, water in the Colorado River is fully appropriated and any diversion of water from the Colorado River would be a significant impact. The USGS has indicated that the PVMGB and the CVGB lies within a basin tributary to the Colorado River and that wells drawing groundwater could be considered to be withdrawing water from the Colorado River Aquifer (Wilson et al., 1994). Consequently, the Project has the potential to divert Colorado River water without any entitlement to the water, and all groundwater production at the site would be considered Colorado River water. Staff understands that the foregoing conclusion is based on a simplified methodology for calculating contribution of water from the Colorado River from the Project's proposed groundwater extraction. The Project applicant could choose to implement **SOIL&WATER-19** Condition of Certification specified in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below to conduct a refined analysis of the quantity of water contributed by the Colorado River from Project groundwater extraction. This

analysis may also be used to estimate the volume of water that must be replaced in accordance with Condition of Certification **SOIL&WATER-15.** The amount of mitigation required would be significantly less under a dry cooled Project versus a wet-cooled Project.

We note that future water use in the CVGB may be governed by impending regulations being formulated by the USBR. These are discussed in the section addressing LORS, below. Waste discharge to the evaporation ponds using the ACC is approximately 50 percent of the wet cooling option (92 gpm compared with the annual average of 182 gpm for the proposed project using wet-cooling). As such, the applicant estimates that approximately one 12-acre evaporation pond would be required for each 125 MW power block (GSEP 2009f).

C.9.6.4 CEQA LEVEL OF SIGNFICANCE

Section 15064.7 of the CEQA Guidelines encourages each public agency to "develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects." The section continues to define a significance threshold as being an "identifiable quantitative, qualitative, or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect will normally be determined to be less than significant."

The Energy Commission, in its role as CEQA lead agency for the Project, has not developed or published significance thresholds related to soil and water resources. In the absence of Energy Commission-specified significance thresholds, the analysis of the significance of potential environmental effects related to soil and water resources contained herein is made based on the criteria specified in Section C.9.3, Methodology and Thresholds for Determining Environmental Consequences, above.

C.9.7 NO PROJECT/NO ACTION ALTERNATIVES

C.9.7.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on Genesis Solar Energy Project application and on CDCA land use plan amendment

Under this alternative, the proposed 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. As a result, the impacts to soils and water from the construction and operation 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 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.

C.9.7.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

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

Under this alternative, the proposed 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 a result, impacts to soils and water would result from the construction and operation of the solar technology and resulting ground disturbance and would likely be similar to the impacts to soils and water from the proposed project, including erosion impacts and impacts to jurisdictional waters. Different solar technologies require different amounts of grading; however, it is expected that all solar technologies would require grading and maintenance. As such, this No Project/No Action Alternative could result in impacts to soils and water similar to the impacts under the proposed project.

C.9.7.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

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

Under this alternative, the proposed 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.9.8 CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental

effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (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).

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 Figure 1** 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 Chuckwalla Valley area, as shown on **Cumulative Impacts Figure 2, I-10 Corridor 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 I-10 Corridor 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.9.9 GEOGRAPHIC EXTENT

The geographic extent used as part of the cumulative impact assessment includes the CVGB. The extent of the basin is described in Section C.9.4.1. Setting and Existing Conditions.

C.9.9.2 EXISTING CUMULATIVE CONDITIONS

Section C.9.4.1, Setting and Existing Conditions describes the current conditions of the CVGB that would take into account existing cumulative conditions as they were known to occur.C.9.9.3 Future Foreseeable Projects

Foreseeable Projects in the Project Area

Foreseeable projects that may impact the soil and water resources of the area were deemed to include only those projects located in the CVGB. **Soil and Water Table 20** lists the foreseeable projects and the anticipated water use associated with each of the projects.

Foreseeable Renewable Projects in the California Desert

All of the foreseeable projects were renewable projects and are listed in **Soil and Water Table 22**.

C.9.9.4 CONTRIBUTION OF THE PROJECT TO CUMULATIVE IMPACTS

Construction and Operation

The construction of the proposed Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the proposed Project. In addition, it is expected that some of the future and foreseeable projects described above may be operational at the same time as the proposed Project. As a result, there may be substantial long term cumulative impacts during operation of these projects related to soils and water resources.

There may be substantial short term and long-term impacts during construction and operations of those cumulative projects related to: soil erosion, geomorphology, changes in the groundwater basin balance, groundwater levels, and groundwater quality, and changes in surface water hydrology and water quality. They are discussed below.

Soil Erosion

Construction the proposed Project would result in both temporary changes at the Project site which could incrementally increase local soil erosion and storm water runoff during construction. The proposed Project would be expected to contribute only a small amount to the possible short term cumulative impacts related to soil erosion because the Project applicant will be required to implement the mitigation measures defined in this analysis, which are expected to bring short term impacts below the level of significance.

Operation of the proposed Project would result in permanent changes at the Project site. These changes could incrementally increase local soil erosion and storm water runoff. The proposed Project would be expected to contribute only a small amount to these possible long term operational cumulative impacts because potential Project-related soil erosion and increased sedimentation resulting from storm water runoff are expected to be reduced to a level of insignificance through implementation of the conditions of certification/mitigation measures **SOIL&WATER-1, 2, 8, 9, 10, 11** and **13** specified in Section C.9.12, below.

Soil and Water Table 22
Foreseeable Projects and Anticipated Water Use

Project	Proponent	BLM Serial ID	Technology	Source	Use	WATER USE – RENEWABLE PROJECTS (afy)									References
						2011	2012	2013	2014	2015	2016	2017	2018	2019-2043	
Chuckwalla Solar I	Chuckwalla Solar I LLC	CACA 48808	Photovoltaic (200MW)	Chuckwalla Basin	Construction	20	20	10	--	--	--	--	--	--	Estimates
					Operation	--	5	7	10	10	10	10	10	10	
Eagle Mountain Soleil	enXco	CACA 49492	Photovoltaic (100MW)	Chuckwalla Basin	Construction	--	10	10	--	--	--	--	--	--	Estimates
					Operation	--	--	--	5	5	5	5	5	5	
Desert Lily Soleil	enXco	CACA 49494	Photovoltaic (100MW)	Chuckwalla Basin	Construction	--	20	20	--	--	--	--	--	--	Estimates
					Operation	--	--	--	5	5	5	5	5	5	
Desert Sunlight Solar Farm	First Solar	CACA 48649	Photovoltaic (550MW)	Chuckwalla Basin	Construction	27	27	27	--	--	--	--	--	--	Estimates
					Operation	--	--	--	4	4	4	4	4	4	
Eagle Mountain Pump Storage	Eagle Crest Energy Company, LLC	FERC 12509001	Pump – Storage (1276MW)	Chuckwalla Basin	Construction	--	308	308	8,066	8,066	8,066	8,066	--	--	Application to FERC
					Operation	--	--	--	--	--	--	--	2,688	1,763	
Genesis Solar Energy	Genesis Solar LLC	CACA 48880	Parabolic Trough (250MW)	Chuckwalla Basin	Construction	1,368	616	616	--	--	--	--	--	--	Application to Energy Commission
					Operation	--	--		1,605	1,605	1,605	1,605	1,605	1,605	
Mule Mountain Solar Project	Bullfrog Green Energy, LLC	CACA 49097	Photovoltaic (500MW)	Chuckwalla Basin	Construction	20	20	20	--	--	--	--	--	--	Estimates
					Operation	--	--	--	1	1	1	1	1	1	
Mule Mountain Soleil	enXco	CACA 49488	Photovoltaic (200MW)	Chuckwalla Basin	Construction	--	20	20	--	--	--	--	==	--	Estimates
					Operation	--	--		10	10	10	10	10	10	
Palen Solar Power	Palen Solar I, LLC	CACA 48810	Parabolic Trough (500MW)	Chuckwalla Basin	Construction	480	480	480	--	--	--	--	--	--	Application to Energy Commission
					Operation	--	--	--	303	303	303	303	303	303	
					Total	1,915	1,526	1,518	10,009	10,009	10,009	10,009	4,631	3,706	

Geomorphology

There is a concern that implementation of all of the reasonably foreseeable projects could have a cumulative impact on the regionally-significant geomorphic processes that transport sand downwind along the Chuckwalla Valley and to the Colorado River. Blocking or disrupting the sand transport corridors would impact various sites that provide habitat for biological resources such as the Mojave Fringe-Toed Lizard. See Section C.2 Biological Resources for further analysis of potential cumulative impacts related to geomorphic processes.

Groundwater Basin Balance

Staff evaluated whether the amount of groundwater used for both construction and operations would place the groundwater basin into overdraft. Groundwater overdraft is "the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions." (CDWR, 1998).

For purposes of impact analysis, it is assumed that any withdrawals that exceed the average natural recharge and exceed a significant percentage of the total amount of groundwater in storage would be a significant impact. The following discussion presents an analysis of the potential for overdraft and significant depletion of groundwater in storage to occur.

A comparison was made between the average annual basin budget with the anticipated foreseeable projects cumulative construction and operation water production requirements. **Soil and Water Table 23** presents the anticipated projects water requirements (Years 2011-2043) along with the average annual basin budget. Currently, the CVGB balance is positive by approximately 2,608 afy whereby inflow (approximately 13,719 afy) to the basin is slightly greater than estimated outflows (approximately 11,111 afy) to the basin.

It is anticipated that groundwater extraction of foreseeable projects during construction of the Project would range from 1,915 afy in Year 2011 and peak at 10,009 afy in Years 2014 through 2017 which would exceed the basin balance in Years 2014 through 2017 by 7,440 afy. The CVGB would be in overdraft conditions commencing in Year 2014. It is anticipated that groundwater extraction during operations of reasonably foreseeable projects would be approximately 3,745 afy which would exceed the basin balance by 1,137 afy. The cumulative change in storage over the construction and operational period (33 years) would amount to approximately -57,000 af, which would equate to less than 0.5 percent of the total amount of the estimated total recoverable groundwater in storage (15,000,000 af).

Soil and Water Table 23
Estimated Change to Chuckwalla Valley Groundwater Basin Budget
(Average Year Conditions)

Years	Annual Basin Budget Balance (1)	Cumulative Project Requirements (afy) (2)	Net Budget Balance (afy)	Cumulative Budget Balance (af)	Cumulative Positive/Deficit as a Percent of Total Recoverable Storage (3)
2011	2,608	1,915	693	693	0.005 percent
2012	2,608	1,526	1,082	1,775	0.012 percent
2013	2,608	1,518	1,090	2,865	0.019 percent
2014	2,608	10,009	-7,401	-4,536	-0.03 percent
2015	2,608	10,009	-7,401	-11,937	-0.080 percent
2016	2,608	10,009	-7,401	-19,338	-0.129 percent
2017	2,608	10,009	-7,401	-26,739	-0.178 percent
2018	2,608	4,631	-2,023	-28,762	-0.192 percent
2019	2,608	4,631	-2,023	-29,860	-0.199 percent
2043	2,608	3,706	-1,098	-56,212	-0.375 percent

Notes:
(1) – See Soil and Water Table 8
(2) – See Soil and Water Table 22
(3) – Based on a total recoverable storage of 15,000,000 af.

However, the amount of water that is storage (estimated to be as much as 15,000,000 af) in the basin greatly exceeds the amount of cumulative overdraft (56,212 af), even taking into account the potential for dramatically increased water demand. In light of these facts, the project's contribution to the cumulative impact to basin balance is less than cumulatively considerable.

Lastly, the I-10 corridor within the CVGB has been targeted for renewable energy projects that have not been identified or quantified as to amounts of water required for development. Given that perennial surface water sources are non-existent and the only available water source is groundwater, it is likely that these as yet unidentified projects could further develop the groundwater resources and exacerbate the cumulative overdraft conditions identified above. However, given the amount of total recoverable groundwater in storage (estimated at 15,000,000 af), the impact would be insignificant.

In addition, the cumulative impact analysis conducted by the Project suggested that during the course of operations for all reasonably foreseeable projects, the subsurface outflow from the CVGB into the PVMGB would decline from approximately 400 afy to approximately 81 afy in 2043 (see WPAR, 2009b Table 2). This could have an indirect significant impact on the Palo Verde Mesa Groundwater Basin by inducing underflow from the Colorado River to the Palo Verde Mesa Groundwater Basin. Staff believes that inducing flow from the Colorado River into the Palo Verde Mesa Groundwater Basin is a significant impact.

Staff believes that the impact related to outflow could be fully mitigated, such that the project would not contribute to cumulative impacts. The measures, **SOIL&WATER-15** and **SOIL&WATER-19** are provided in detail in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below.

Groundwater Levels

The regional model used by AECOM (2010a) is a two-dimensional superposition model developed using MODFLOW code (Harbaugh et al., 2000) for the Parker-Palo Verde-Cibola area, which includes the CVGB and the Project site. The model employed a simple vertical geometry and a large grid spacing to evaluate the impacts from groundwater pumping on the Colorado River.

The modeling results suggest (see **Soil and Water Figure 20**) that during the life of all the reasonably foreseeable projects, groundwater level declines of five feet or more would be located at a distance of approximately 4 miles from the proposed production wells at the Project site. The closest existing well is located at a distance of 3 miles. In addition, water level declines of 1 foot or more could be observed up to eight miles from the proposed production wells.

Staff notes that modeling conducted by the applicant indicated water level declines less than what is conservatively presented here. While preliminary studies and calculations have been made to assess the potential for impact, the quantification of the impact is an estimate and impacts cannot be accurately quantified until actual long-term groundwater production occurs. Consequently, staff believes it is appropriate to assume that the potential impact to water levels in existing wells appears to be cumulatively significant, and require monitoring and mitigation in the event that monitoring indicates significant impacts. Implementation of Conditions of Certification **SOIL&WATER-3** through **SOIL&WATER-5** specified in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, will mitigate any such impacts to groundwater users (wells) due to lowering of the groundwater table. Impacts and proposed mitigation associated with biological dependent resources is discussed in Section C.2, Biological Resources***.***

Groundwater Quality

There is a potential that significant cumulative groundwater quality impacts could occur from the proposed Projects as listed on Soil and Water Table 20 during construction and operation if contaminated or hazardous materials used during construction and operations were to be released and migrate to the groundwater table.

The proposed Project would be expected to contribute only a small amount to the possible short-term cumulative impacts related to groundwater quality, given the distance to the groundwater table (70-90 feet bgs) over the CVGB and the proposed implementation of a hazardous material management plan as well as monitoring plans associated with operation of LTUs, surface impoundments, septic systems and other various operations. With implementation of the mitigation measures Conditions of Certification **SOIL&WATER-6** and **7** and **SOIL&WATER-20** specified in Section C.9.12, *Proposed Conditions of Certification/Mitigation Measures,* below, cumulative impacts associated with the Project to groundwater quality are anticipated to be below the level of significance.

Surface Water Hydrology

The cumulative impacts of the proposed Projects as listed on Soil and Water Table 20 on the local surface water hydrology are directly related to proposed onsite grading and

the potential construction and operation of a network of engineered collector/conveyance channels designed for the purpose of protecting the various projects from flooding. The proposed projects could change both the extent and physical characteristics of the existing floodplains within and downstream of each project site,. There is not enough information available on each site nor has a regional study been completed to define the extent of the cumulative effects of these projects on surface water within the watershed. However, it is assumed that each of these projects will be required to define their impacts and mitigate where required.

The proposed Project would be expected to contribute only a small amount to the possible short-term cumulative impacts related to surface water hydrology because the implementation of the mitigation measures specified in Section C.9.12, below, would reduce the project specific impacts below the level of significance.

Surface Water Quality

The cumulative impacts of the proposed foreseeable projects as listed on **Soil and Water Table 22** could have an impact on surface water quality. It is expected that stormwater generated on the various project sites may encounter soil or chemicals deleterious to aquatic and terrestrial plant and wildlife. It is expected that all of the projects would be required to implement BMPs for managing potentially harmful storm water and protect water quality. Implementation of the conditions of certification/mitigation measures **SOIL&WATER-1, 2, 8, 9, 10, 11** and **13** specified in Section C.9.12, below would reduce the project specific impacts below the level of significance. Potentially significant water quality impacts could occur during operations if contaminated or hazardous materials used during operations were to contact storm water and drain offsite. It is expected that all of the projects would have Hazardous Material Management Plans (see Section C.4, Hazardous Materials Management) to reduce impacts below the level of significance.

All of the proposed projects would alter natural storm water drainages and the expected use of BMPs would reduce potentially significant impacts related to concentrated drainage and ensuing soil erosion and sediment transport offsite. The proposed Project would be expected to contribute only a small amount to the possible short-term cumulative impacts related to surface water quality with implementation of the Conditions of Certification **SOIL&WATER-1, 2, 8, 9, 10, 11** and **13** specified in Section C.9.12, below would reduce the project specific impacts below the level of significance..

Closure and Decommissioning

The decommissioning of the proposed Project is expected to result in adverse impacts related to soils and water resources 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 soils and water resources during decommissioning of the proposed Project generated by the cumulative projects. The impacts of the decommissioning of the proposed Project would not be expected to contribute to cumulative impacts related to soils and water resources. To ensure there would be no impacts to soil and water

resources during and after project decommissioning the applicant should be required to comply with Condition of Certification **SOIL&WATER–14.**

C.9.10 COMPLIANCE WITH LORS

Applicable Federal, State, and local LORS are summarized discussed in the following text. Non-applicable Federal and State LORS are also discussed to explain why they are not applicable.

C.9.10.1 FEDERAL

Clean Water Act (CWA) of 1977 (Including 1987 Amendments) Sections 401, 402 and 404

The primary objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's surface waters. Pollutants regulated under the CWA include "priority" pollutants, including various toxic pollutants; "conventional" pollutants, such as biochemical oxygen demand, total suspended solids, oil and grease, and pH; and "non-conventional" pollutants, including any pollutant not identified as either conventional or priority.

Clean Water Act Section 401

Section 401 of the CWA requires certification from the CRBRWQCB that the proposed project is in compliance with established water quality standards. Projects that have the potential to discharge pollutants are required to comply with established water quality objectives. These requirements include the implementation of BMPs during site grading activities and other activities associated with construction of the facility.

Section 401 provides the SWRCB and the CRBRWQCB with the regulatory authority to waive, certify, or deny any proposed federally permitted activity, which could result in a discharge to waters of the State. To waive or certify an activity, these agencies must find that the proposed discharge will comply with state water quality standards. According to the CWA, water quality standards include beneficial uses, water quality objectives/criteria, and compliance with the EPA's anti-degradation policy.

No license or permit may be issued by a federal agency until certification required by Section 401 has been granted. Under the CWA, USACE Section 404 permits are subject to CRBRWQCB Section 401 Water Quality Certification (Title 23 CCR Sections 3830 through 3869). As such, a determination of "federal waters" under Section 404 is required by the USACE. The ephemeral drainages on the Site were found not to conform to the requirements for designation as jurisdictional waters of the U.S. (S. Sanders, 2010)

While there is not a direct requirement under a 404 jurisdiction, the CRBRWQCB has authority under Porter-Cologne to regulate discharge of waste to waters of the state. The definition of the waters of the state is broader than that for waters of the U.S. in that all waters are considered to be a water of the state regardless of circumstances or condition. The term "discharge of waste" is also broadly defined in Porter-Cologne, such that discharges of waste include fill, any material resulting from human activity, or any

other “discharge” that may directly or indirectly impact waters of the state relative to implementation of Section 401 of the CWA.

Porter-Cologne authorizes the CRBRWQCB to regulate discharges of waste and fill material to waters of the state, including “isolated” waters and wetlands, through the issuance of waste discharge requirements (WDRs). Under Porter-Cologne all parties proposing to discharge waste that could affect the quality of waters of the state, other than into a community sewer system, shall file with the appropriate CRBRWQCB a Report of Waste Discharge (ROWD) containing such information and data as may be required by the CRBRWQCB. As such, the PSPP will file a ROWD for evaluation of 401 water quality impacts and in association with the proposed LTU. The schedule for filing of such document is provided in Section 5.17.1.5.

Clean Water Act Section 402

Direct and indirect discharges and stormwater discharges into waters of the United States must be made pursuant to a NPDES permit (CWA Section 402). NPDES permits contain industry-specific, technology-based limits and may also include additional water quality-based limits, and establish pollutant-monitoring requirements. A NPDES permit may also include discharge limits based on Federal or State water quality criteria or standards.

In 1987, the CWA was amended to include a program to address stormwater discharges for industrial and construction activities. Stormwater discharge is covered by an NPDES permit, either as an individual or general permit. The Colorado River Basin RWQCB administers the NPDES permit program under the CWA in the Project area. Appendix L of this AFC provides a preliminary construction DESCP.

Clean Water Act Section 404

Activities resulting in the dredging or filling of jurisdictional waters of the U.S. require authorization under a Section 404 permit issued by the USACE. The USACE may grant authorization under either an individual permit or a nationwide permit (NWP) to address operations that may affect the ephemeral washes on the Project site. Section 404 permits are also subject to CWA Section 401 water quality certification through the CRBRWQCB.

An evaluation for jurisdictional waters on the Project site was performed by the Project applicant. The ephemeral drainages on the Site were found not to conform to the requirements for designation as jurisdictional waters of the U.S. Discussions with the USACE indicated that the drainages would not be considered jurisdictional waters of the U.S. (S. Sanders, 2010)..

The U.S. Bureau of Reclamation, Colorado River – Proposed Accounting Surface Rule, 73 Federal Register 40, 916 (July 16, 2008) (subsequently withdrawn)

The Consolidated Decree of the United Sates Supreme Court in Arizona vs. California, 547 U.S. 150 recognized that consumptive use of water from the Colorado River can occur by groundwater withdrawal. Under this decree, users within the lower Colorado River Basin (which includes the PSPP) can divert tributary flow before it reaches the Colorado River. Once it reaches the river, entitlements are required for diversions.

Wilson and Owen-Joyce and Owen-Joyce and others proposed the “river aquifer”, which is hydraulically connected to the Colorado River, and the “accounting surface”, which is defined as groundwater levels that would occur should the Colorado River be the only source of groundwater in the aquifer. Water levels higher than the accounting surface indicate recharge from tributary water sources.

Wells drawing water from the river aquifer (or water below the accounting surface) draw water from the Colorado River, and as such need to be accounted in the consumptive use of the river. In cases where water is drawn from the river aquifer, an entitlement is required from the USBR. The USBR proposed the accounting surface rule to eliminate the unlawful use of Colorado River on July 16, 2008 in the Federal Register (73 Federal Regulation 40,916). The USBR is currently preparing a new proposed rule.

The Project is proposing to use annually about 300 afy of groundwater from an onsite source for operational processes, including mirror washing, process makeup, equipment cooling, dust suppression and potable uses. Because groundwater is the only source of water for the proposed Project, and if the proposed rule is established, the Project applicant will be required to submit an Application for Lower Colorado Water Supply Project Water to the Colorado River Board of California for entitlement to the groundwater. A contract with the City of Needles would be required to withdraw this water. Currently, a preliminary timeline for final implementation of the accounting surface rule is Summer 2011.

C.9.10.2 STATE

The administering agencies for the State LORS are the Energy Commission, the State Water Resources Control Board (SWRCB), and the CRBRWQCB.

State of California Constitution Article X, Section 2

Article X, Section 2 prohibits the waste or unreasonable use of water, regulates the method of use and method of diversion of water and requires all water users to conserve and reuse available water supplies to the maximum extent possible. The project use of dry cooling will significantly reduce potential water use and prohibit waste and unreasonable use of groundwater.

California Storm Water Permitting Program

California Construction Storm Water Program. Construction activities that disturb one acre or more are required to be covered under California’s General Permit for Discharges of Storm Water Associated with Construction Activity, Water Quality Order 99-08-DWQ (General Construction Permit CAS 000002).

Activities subject to permitting include clearing, grading, stockpiling, and excavation. The General Construction Permit requires the development and implementation of a SWPPP that specifies BMPs that will reduce or prevent construction pollutants from leaving the site in storm water runoff and will also minimize erosion associated with the construction project. The SWPPP must contain site map(s) that show the construction site perimeter; existing and proposed structures and roadways; storm water collection and discharge points, general topography both before and after construction; and drainage patterns across the site. Additionally, the SWPPP must describe the

monitoring program to be implemented. Project also will prepare a DESCP to meet Energy Commission requirements (Appendix L). The content of a DESCP is very similar to a SWPPP, but the DESCP covers both construction and operation in one document whereas separate SWPPPs are prepared for construction and operation.

California Industrial Storm Water Program. Industrial activities with the potential to impact stormwater discharges are required to obtain a NPDES permit for those discharges. In California, an Industrial Storm Water General Permit, Order 97-03-DWQ (General Industrial Permit CAS 000001) may be issued to regulate discharges associated with ten broad categories of industrial activities, including electrical power generating facilities. The General Industrial Permit requires the implementation of management measures that will protect water quality. In addition, the discharger must develop and implement a SWPPP and a monitoring plan. Through the SWPPP, sources of pollutants are to be identified and the means to manage the sources to reduce storm water pollution described. The monitoring plan requires sampling of storm water discharges during the wet season and visual inspections during the dry season.

A report documenting the status of the program and monitoring results must be submitted to the CRBRWQCB annually by July 1. The General Industrial Permit, which requires the development and implementation of a SWPPP, is required for the Project's operations phase. The Project applicant will prepare a separate SWPPP that outlines the monitoring and reporting plan, along with storm water mitigation measures for the facility based on BMPs.

<u>California Water Code</u>

Section 461. Stipulates that the primary interest of the people of the State of California is the conservation of all available water resources and requires the maximum reuse of reclaimed water as an offset to using potable resources.

The applicant was exploring a possible agreement with Chuckwalla Valley State Prison to treat reclaimed wastewater from that facility. Although the applicant states the amount of water would be insufficient for project needs, Staff urges Project to consider the option as a way to offset some use of groundwater.

Section 1200 "Water Rights." All water in California falls within one of three categories: surface water, percolating groundwater, or "subterranean streams that flow through known and definite channels." California's water rights law is a hybrid system in that the use of certain types of water requires a permit from the SWRCB, while other types of uses are governed by common law. Only surface water and subterranean stream water are within the permitting jurisdiction of the SWRCB. Since 1914, appropriation of those waters has required a SWRCB permit, and is subject to various permit conditions.

Interstate water courses (such as the Colorado River) have additional contract requirements that are the equivalent of permits. For example, use of Colorado River water requires a contract with the Secretary of the Interior (through the Bureau of Reclamation).

Pre-1914 appropriative and riparian rights do not require a permit. Riparian rights are correlative rights of equal priority among all riparian right holders. The place of use of such water is limited to riparian property (property that is contiguous to a watercourse) that has not had its riparian rights severed. Riparian rights are senior to any appropriative rights, and may not be separated from the riparian parcel and used elsewhere.

Groundwater can be (a) the underground portion of a surface water course (subject to the same rights/permits as the affiliated water course); (b) a wholly underground water course which is treated like a water course; or (c) percolating groundwater. Water subject to appropriation is defined in Water Code Section 1201, as "all water flowing in any natural channel," except water that is or may be needed for use upon riparian land or water that is otherwise appropriated. The SWRCB's authority over groundwater extends only to the underground portion of a surface stream and to the water in un-appropriated subterranean streams that flow through known or defined channels, except as it is or may be reasonably be needed for useful and beneficial purposes upon lands riparian to the channel through which it is flowing. The traditional test to establish SWRCB jurisdiction over groundwater was whether there is sufficient evidence of bed and banks and water flowing along a line of a surface stream (Sax 2002).

Recent case law has redefined the boundaries of an underground stream to mean the bedrock bottom and side boundaries that are materially less permeable than the alluvium holding groundwater found within an alluvial valley across which flows a surface stream. If there is insufficient evidence to support a finding that the groundwater fits this definition, the SWRCB has no jurisdiction and no permit is required to appropriate the water.

Percolating groundwater has no SWRCB permit requirement and supports two kinds of rights: (a) overlying rights, a correlative right of equal priority shared by all who own overlying property and use groundwater on the overlying property; and (b) groundwater appropriative rights for use of the overlying property or on overlying property for which the water rights have been severed. The right to use groundwater on property that is not an overlying right is junior to all overlying rights, but has priority among other appropriators on a first in time use basis. Overlying users cannot take unlimited quantities of water without regard to the needs of other users. Surplus groundwater may be appropriated for use on non-overlying lands, provided such use will not create an overdraft condition.

Riparian water rights, groundwater rights and appropriative rights are all subject to modification to some degree if there is a basin-wide adjudication, which proceeding can be commenced before the SWRCB as an adjudicative body (not a permitting role) or before a court. In adjudication, unused riparian rights and unused overlying rights can be subordinated to appropriative rights.

Water rights in California can be held by any legal entity. Thus the owner can be an individual, related individuals, non-related individuals, trusts, corporations and/or government agencies. Water rights are considered real property. Riparian rights and overlying groundwater rights are lost if severed from the land, while appropriative rights can be preserved and transferred to other properties. Transfers of water for use

elsewhere are permissible without transfers of water rights, subject to many other conditions and approvals, including a "non-injury" to other water rights holders test, assessment of environmental impacts, and for post 1914 appropriative rights, SWRCB approval of any change in place of use, diversion point and/or purpose of use.

The California Water Code allows any local public agency that provides water service whose service area includes a groundwater basin or portion thereof that is not subject to groundwater management pursuant to a judgment or other order, to adopt and implement a groundwater management plan (California Water Code Sections 10750 et. seq.) Groundwater Management Plans often require reports of pumping and some restrictions on usage. There is no Groundwater Management Plan for the CVGB listed on the DWR website on Groundwater Management Plans.

The California Legislature has found that by reason of light rainfall, concentrated population, the conversion of land from agricultural to urban uses and heavy dependence on groundwater, the counties of Riverside, Ventura, San Bernardino and Los Angeles have certain reporting requirements for groundwater pumping. Any person or entity that pumps in excess of 25 af of water in any one year must file a "Notice of Extraction and Diversion of Water" with the SWRCB. (See Water Code Sections 4999 et. seq.) The Project would be subject to this requirement since it is located in Riverside County and will require more than 25 afy. Condition of Certification SOIL&WATER-16 would ensure the applicant complies with this requirement.

The Project is in Riverside County and the Chuckwalla Valley has no perennial streams. The Project site is located on BLM land that overlies the CVGB, which has a surface area of about 822,000 acres. A method was developed by the USGS, in cooperation with the USBR, to identify groundwater wells outside the flood plain of the lower Colorado River that yield water that will be replaced by water from the river. Wells placed into the groundwater beneath the Project site that extract groundwater may be considered as drawing water from the Colorado River and require an entitlement to extract groundwater. The specific method to determine whether wells draw water from the Colorado River (referred to as the accounting surface) has not been promulgated by the USBR. Entitlements to extract and use the groundwater beneath the site are granted by the USBR through their designated representative in California, the Colorado River Board of California. After eligibility for groundwater extraction has been approved by the USBR, a contract must be established with the City of Needles to acquire the water. In California, the City of Needles monitors the use of water extracted from the river aquifer and is the designated contracting agent for the USBR.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1967, Water Code Section 13000 et. seq. requires the SWRCB and the nine RWQCBs to adopt water quality standards to protect State waters. Those standards include the identification of beneficial uses, narrative and numerical water quality criteria, and implementation procedures. Water quality standards for the proposed project area are contained in the Water Quality Control Plan for the Colorado River Basin Region (Basin Plan), which was adopted in 1994 and was amended in 2006. This plan sets numeric and/or narrative water quality criteria controlling the discharge of wastes to the State’s waters and land.

The Project applicant proposes to construct a LTU as part of the facility. The LTU will be used to receive, temporarily store, and treat soil impacted with heat transfer fluid (HTF). The Project will comply with Title 23 CCR Division 3, Chapters 9 and 15 regarding the establishment of requirements for waste discharge and reporting along with requirements specifying conditions for the protection of water quality. Under Chapter 9, the CRBRWQCB is required to issue a ROWD for discharges of waste to land pursuant to the Water Code. The report requires the submittal of information regarding the proposed discharge and waste management unit design and monitoring program. WDRs issued by the CRBRWQCB provide construction and monitoring requirements for the proposed discharge. Chapter 15 outlines siting, construction, and monitoring requirements for waste discharges to land for landfills, surface impoundments, LTUs, and waste piles. The Chapter provides closure and post-closure maintenance and monitoring requirements for Class II designated waste facilities that are applicable to this project.

The Project will also comply with CCR Title 27 Division 2, Chapter 3. Section 20377 provides guidance for LTUs, referencing general criteria (Section 20320), precipitation, and drainage control (Section 20365) and seismic design requirements (Section 20370). Section 20250 stipulates operational and maintenance procedures to minimize mobilization of waste materials.

Section 13050. Surface waters (including ephemeral washes) that are affected by the Project are waters of the State and are subject to State requirements and the CRBRWQCB' authority to issue WDRs for construction and industrial storm water activities.

Section 13260 et seq. This section requires filing with the appropriate CRBRWQCB a ROWD for activities in which waste is discharged that could affect the water quality of the State. The report shall describe the physical and chemical characteristics of the waste and include the results of all tests required by regulations adopted by the board, any test adopted by the Department of Toxic Substances Control (DTSC) pursuant to Section 25141 of the Health and Safety Code for extractable, persistent, and bioaccumulative toxic substances in a waste or other material, and any other tests that the SWRCB or CRBRWQCB may require.

Section 13173 (Designated Wastes). This section defines designated waste as either: a) hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 14142 of the Health and Safety Code, or, b) Non-hazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or could reasonably be expected to affect beneficial uses of the waters of the state contained in the appropriate state water quality control plan.

As noted above, the Project applicant proposes to construct an LTU to treat HTF-impacted soils. In 1995, the California DTSC determined that soils containing HTF up to 10,000 mg/kg were considered nonhazardous. However, recently the DTSC indicated that any determination of waste classification needs to be site specific.

Section 13240 et seq. (Water Control Plan). The Basin Plan for the Colorado River Basin Region establishes water quality objectives, including narrative and numerical standards that protect the beneficial uses of surface and ground waters in the region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provide 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, Beneficial Uses; Chapter 3, Water Quality Objectives; and the sections of Chapter 4, Implementation, entitled "Point Source Controls" and "Non-Point Source Controls."

- Beneficial Uses: Chapter 2 of the Basin Plan describes beneficial uses of surface and ground waters. Beneficial uses of surface waters for the Chuckwalla Valley are not listed in the Basin Plan. The beneficial uses of ground waters of the Chuckwalla Valley Hydrologic Unit (717.00) are: municipal and domestic supply, industrial service supply, and agricultural supply.
- Water Quality Objectives: Region-wide numeric and narrative objectives for general surface waters are described in Chapter 3 of the Basin Plan under the "General Surface Water Quality Objectives" and region-wide objectives for groundwater under the "Ground Water Objectives."
- Waste Discharge Requirements: Chapter 4 of the Basin Plan describes "Point-Source Controls" for wastewater reclamation and reuse, stormwater, and septic systems. The discussion of "Non-Point Source Controls" in the Basin Plan describes the authority given to the CRBRWQCB to certify projects for CWA Section 401 permits.

Section 13243. Under this section, the Regional Water Boards are granted authority to specify conditions or areas where the discharge of waste will not be permitted. The discharge of designated waste can only be discharged to an appropriately designed waste management unit.

Section 13263 (Waste Discharge Requirements). The CRBRWQCB will regulate the proposed discharge of fill material, including structural material and/or earthen wastes into wetlands and other waters of the State through WDRs. The CRBRWQCB considers WDRs necessary to adequately address potential and planned impacts to waters of the State and to require mitigation for these impacts to comply with the water quality standards specified in the Basin Plan.

WDRs from the CRBRWQCB are required for the LTU that will be used to treat (through bioremediation techniques) HTF-impacted soil and surface impoundments that are used to treat wastewater (excluding sanitary wastes) from Project operations. The Project applicant has submitted an ROWD application to the CRBRWQCB.

Section 13271 (Discharge Notification). CWC section 13271 requires any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the state, or discharge or deposited where it is, or probably will be, discharged in or on any waters of the state, to notify the Office of Emergency Services (OES) of the discharge as specified in that section. The

OES then immediately notifies the appropriate regional board and the local health officer and administrator of environmental health of the discharge.

Section 13550. "The Legislature hereby finds and declares that the use of potable domestic water for non-potable uses, including, but not limited to, cemeteries, golf courses, parks, highway, landscaped areas, and industrial and irrigation uses, is a waste or an unreasonable use of the water within the meaning of Section 2 of Article X of the California Constitution if recycled water is available which meets all of the following conditions, as determined by the State Board." This section requires the use of recycled water for industrial purposes subject to recycled water being available and upon a number of criteria including: provisions that the quality and quantity of the recycled water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not impact downstream users or biological resources.

Section 13551. This section prohibits a person or public agency, including a State agency, city, county, city and county, district, or any other political subdivision of the State, shall not use water from any source of quality suitable for potable domestic use for non-potable uses if suitable recycled water is available as provided in Section 13550.

Section 13552. This section specifically identifies the use of potable domestic water for cooling towers as unreasonable use of water within the meaning of Article X Section 2 of the California Constitution, if suitable recycled water is available and the water meets the requirements set forth in Section 13550.

Section 13571. Requires that anyone who constructs, alters, or destroys a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well, file a well completion report with the California Department of Water Resources (CDWR). With no nearby sources of water available and no existing water supply wells on the Project site, a water supply well and groundwater monitoring wells will be constructed at the Site. These wells are required as part of the evaluation of water resources for the Project. A well completion report will be filed with DWR for each well that is constructed. Measures will be undertaken to protect the groundwater wells (whether for water supply or for monitoring purposes) on the Project site through the use of physical barriers (e.g., fencing, traffic bollards, etc.). In the event that an existing well is altered or destroyed, a well completion report will be filed with the DWR.

California Code of Regulations

Title 22, Article 3, Sections 64400.80 through 64445. This section requires monitoring for potable water wells, defined as non-transient, non-community water systems (serving 25 people or more for more than six months); the Project will employ approximately 130 workers during operations. Regulated wells must be sampled for bacteriological quality once a month and the results submitted to the California Department of Health Services (DHS). The wells must also be monitored for inorganic chemicals once and organic chemicals quarterly during the year designated by the DHS. DHS will designate the year based on historical monitoring frequency and laboratory capacity. Condition of Certification **SOIL&WATER-12** would ensure the applicant complies with this requirement.

Title 23, Division 3, Chapter 9. This chapter requires the CRBRWQCB to issue a report of waste discharge for discharges of waste to land pursuant to the Water Code. The report requires submittal of information regarding the proposed discharge and waste management unit design and monitoring program. WDRs issued by the CRBRWQCB provide construction and monitoring requirements for the proposed discharge. The SWRCB has adopted general waste discharge requirements (97-10-DWQ) for discharge to land by small domestic wastewater treatment systems.

Traditionally the State Water Resources Control Board along with the applicable California Regional Water Quality Control Board (hereafter "Water Boards") develop, adopt, and enforce waste discharge requirements for facilities that discharge waste. When such a facility is an electrical generating facility under the Energy Commission's jurisdiction, however, the Energy Commission permit takes the place of the Water Boards' permit and the WDRs are folded into the Energy Commission's conditions of certification. Nevertheless, Energy Commission staff believe it is important to have the Water Boards retain the authority to enforce these requirements, along with the authority to monitor, inspect, and collect an annual fee, because they are state and local agencies with expertise in this subject area. Therefore, staff recommends that the Energy Commission delegate this authority to the Water Boards pursuant to title 20, California Code of Regulations, section 1770(b), and has provided language to that effect in Condition of Certification **SOIL&WATER-6**. The Water Boards may also take action in tandem with delegation by the Energy Commission to prescribe the requirements adopted by the Energy Commission to ensure that their agents are fully informed and authorized to enforce the WDRs in the Commission's decision.

With respect to onsite wastewater discharge, the CRBRWQCB adopted in 1984 "Guidelines for Sewage Disposal from Land Developments" that provides exclusion of on-site sanitary wastewater flows less than 5,000 gpd. Correspondingly, since each Power Unit will have a sanitary wastewater disposal system with a maximum capacity of 2,750 gpd the exclusion applies and the sanitary wastewater disposal system will be designed in accordance with County of Riverside requirements (see Section C.9.10.3).

Title 23, Division 3, Chapter 15. Regulates all discharges of hazardous waste to land that may affect water quality. Chapter 15 broadly defines a waste management area as "an area of land, or a portion of a waste management facility, at which waste is discharged." Therefore, unless exempted, all discharges of hazardous waste to land that may affect water quality are regulated by Chapter 15. This chapter outlines siting, construction and monitoring requirements for waste discharges to land for landfills, surface impoundments, land treatment units, and waste piles. The chapter provides closure and post-closure maintenance and monitoring requirements for surface impoundments that are applicable to the Project.

Title 27, Section 2000 et seq. and Title 23, Section 2510 et seq. These sections include requirements for siting and minimum waste management standards for discharges of waste to land. Establishes monitoring and corrective action requirements for discharges to land, including spills and leaks and other unauthorized discharges. Requires, assurances of financial responsibility for closure and post-closure activities and corrective actions for all known or reasonably foreseeable releases.

As discussed above, the Project would employ a LTU to manage soils impacted by releases of HTF. Provisions of Title 27 CCR apply to designated and non-hazardous solid waste. Provisions of Title 23 apply to hazardous waste. Energy Commission and CRBRWQCB staff are currently developing requirements for monitoring, mitigating, and reporting that will ensure compliance with these regulations and will include them as a condition of certification. Engineered alternatives that are consistent with Title 27 and Title 23 CCR performance goals may be considered for approval by the CRBRWQCB.

Section 20375 provides guidance for surface impoundments, including construction requirements (Table 4.1), operation, maintenance, and inspection. Section 20377 provides guidance for LTUs, referencing general criteria (Section 20320) and precipitation and drainage control (Section 20365) and seismic design requirements (Section 20370). The regulations stipulate operational and maintenance procedures to minimize mobilization of the waste materials (Section 20250).

State Water Resources Control Board Policies

Anti-Degradation Policy (Resolution No. 68-16). Requires the CRBRWQCB, in regulating the discharge of waste, to: (a) maintain existing high quality waters of the State until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses, and will not result in water quality less than that described in State or Regional Water Boards policies; and (b) require 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.

Power Plant Cooling Water Policy (Resolution No. 75-58). On June 19, 1975, the SWRCB adopted the Water Quality Control Policy on the Use and Disposal of Inland Waters used for Power Plant Cooling. The purpose of the policy is to provide consistent statewide water quality principles and guidance for adoption of discharge requirements, and implementation actions for power plants that depend on inland waters for cooling.

The Resolution encourages the use of wastewater for power plant cooling and sets the following order of preference for cooling purposes: 1) wastewater being discharged to the ocean; 2) ocean water; 3) brackish water or irrigation return flows; 4) inland waste waters of low total dissolved solids (TDS); and 5) other inland waters. The criteria for the selection of water delivery options involves economic feasibility; engineering constraints, such as cooling water composition and temperature; and environmental considerations such as impacts on riparian habitat, groundwater levels, and surface and subsurface water quality.

Water Reclamation Policy (Resolution No. 77-01). Under this policy, the SWRCB and CRBRWQCBs shall encourage reclamation and reuse of water in water-short areas. Reclaimed water will replace or supplement the use of fresh water or better quality water.

Sources of Drinking Water Policy (Resolution No. 88-63). This policy designates all groundwater and surface waters of the States as potential sources of drinking water, worthy of protection for current or future beneficial uses, except where: (a) the total dissolved solids are greater than 3,000 milligrams per liter, (b) the well yield is less than 200 gallons per day (gpd) from a single well, (c) the water is a geothermal resource, or in a water conveyance facility, or (d) the water cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices.

Policies and Procedures for Investigations and Clean-up and Abatement of Discharges Under CWC Section 13304 (Resolution No. 92-49). This policy establishes requirements for investigation and cleanup and abatement of discharges. Under this policy, clean-up and abatement actions are to implement applicable provisions of Title 23 CCR Chapter 15, to the extent feasible. The policy also requires the application of Section 2550.4 of Chapter 15 when approving any alternative cleanup levels less stringent than background. It requires remediation of the groundwater to the lowest concentration levels of constituents technically and economically feasible, which must be at least protect the beneficial uses of groundwater, but need not be more stringent than is necessary to achieve background levels of the constituents in groundwater.

Water Quality Control Policy for Recycled Water (Resolution No. 209-0011). (Not yet approved by Office of Administrative Law as of May 2009). The Recycled Water Policy is intended to promote sustainable local water supplies. The purpose of this Policy is to increase the use of recycled water from municipal wastewater sources that meets the definition in CWC Section 13050(n), in a manner that implements state and Federal water quality laws.

LORS and State Policy and Guidance

The Energy Commission has five sources for statements of policy relating to water use in California applicable to power plants. They are the California Constitution, the Warren-Alquist Act, the Commission's restatement of the State's water policy in the 2003 Integrated Energy Policy Report ("IEPR"), the State Water Resources Control Board ("SWRCB" or "Board") resolutions (in particular Resolutions 75-58 and 88-63), and the Genesis Solar Project Committee's water-issues order as guidance for interpreting all of the above.

California Constitution

Article X, section 2 prohibits the waste or unreasonable use, including unreasonable method of use, of water, and it requires all water users to conserve and reuse available water supplies to the maximum extent possible (Cal. Const., art. X, § 2). Groundwater is subject to reasonable use (*Katz v. Walkinshaw* (1903) 141 Cal. 116).

Warren-Alquist Act

Section 25008 of the Energy Commission's enabling statutes echoes the Constitutional concern, by promoting "all feasible means" of water conservation and "all feasible uses" of alternative water supply sources (Pub. Resources Code § 25008).

Integrated Energy Policy Report

In the 2003 Integrated Energy Policy Report (IEPR or Report), the Energy Commission reiterated certain principles from SWRCB's Resolution 75-58, discussed below, and clarified how they would be used to discourage use of fresh water for cooling power plants under the Commission's jurisdiction. The Report states that the Commission will approve the use of fresh water for cooling purposes only where alternative water supply sources or alternative cooling technologies are shown to be ''environmentally undesirable" or "economically unsound" (IEPR (2003), p. 41). In the Report, the Commission interpreted "environmentally undesirable" as equivalent to a "significant adverse environmental impact" under CEQA, and "economically unsound" as meaning "economically or otherwise infeasible," also under CEQA (IEPR, p. 41). CEQA and the Commission's siting regulations define feasible as "capable of being accomplished in a successful manner within a reasonable amount of time," taking into account economic and other factors (Cal. Code Regs., tit. 14, § 15364; tit. 20, § 1702, subd. (f)). At the time of publication in 2003, dry cooling was already feasible for three projects—two in operation and one just permitted (IEPR, p. 39).

The Report also notes California's exploding population, estimated to reach more than 47 million by 2020, a population that will continue to use "increasing quantities of fresh water at rates that cannot be sustained" (IEPR, p. 39).

State Water Resources Control Board Resolutions

The SWRCB not only considers quantity of water in its resolutions, but also the quality of water. In 1975, the Board adopted the *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling* (Resolution 75-58). In it, the Board encourages the use of wastewater for power plant cooling. It also determined that water with a TDS concentration of 1,000 mg/L or less should be considered fresh water (Resolution 75-58). One express purpose of that Resolution was to "keep the consumptive use of fresh water for power plant cooling to that *minimally essential*" for the welfare of the state (*Ibid*; emphasis added).

In 1988, the Board determined that water with TDS concentrations of 3,000 mg/L or less should be protected for and considered as potential supplies for municipal or domestic use unless otherwise designated by one of the Regional Water Quality Control Boards (Resolution 88-63).

Order from the Genesis Solar Project Committee

The Genesis Solar Project Committee considered all these sources of policy to arrive at a simple yet flexible determination for water use by power plants under Commission jurisdiction. The Order states:

> The Committee reads [the policies] as requiring projects seeking to use groundwater for power plant cooling to use the least amount of the worst available water, considering all applicable technical, legal, economic, and environmental factors (Genesis Solar Energy Project Committee, Decision and Scoping Order, Feb. 2, 2010).

Staff carefully considers all relevant factors when conducting analysis and arriving at recommendations for the Commission. Thus, staff must determine what is the least but nevertheless feasible amount of water available for use, and also the worst, feasible available water that applicant could use for particular purposes on a project.

In several cases, the Commission has accepted conservation programs that conserve water in the region as means of accepting compliance with the water policies. Staff - agrees that such conservation programs are an acceptable method to ensure compliance for current projects, although less desirable than avoiding the use of water for cooling altogether.

Proposed Use of Wet Cooling by the Genesis Solar Energy Project

To summarize, the applicant for the Genesis Solar Energy Project applicant proposes a wet-cooled facility that would use 1,605 acre feet a year (afy) of groundwater from onsite wells. Chuckwalla Valley is the source of groundwater for the project area. The project would pump water from new wells drilled near the project's power blocks. Pumped water would be used for various purposes besides cooling, including domestic use by workers, dust suppression, and mirror washing. Water is the only feasible means of cleaning the mirrors, which must be clean to maintain efficiency of output by parabolic trough solar plants. No use of reclaimed water and no recycling of water is currently proposed. Reject water from the treatment process would be discharged to evaporation ponds. Overall use of water would be inefficient for this technology, requiring 658 afy per 100 MW of capacity, or 2.834 acre feet per gigawatt hour generated versus 60 afy per 100 MW of capacity, or 0.30 acre feet per gigawatt hour generated for dry-cooled technology.

Quality of groundwater varies markedly in the basin and in the immediate project area. The Project applicant's test drilling found low quality water, with TDS levels of 5,000 mg/l or more, well beyond the CRBRWQCB Basin Plan's definition of municipal water of TDS levels at 3,000 mg/l or less.

The use of groundwater for wet cooling compounds the environmental concerns caused by the applicant's proposal to use evaporation ponds for disposal of the wastewater generated by the wet cooling process. 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. If the Applicant chooses to implement ZLD technology, a Condition of Certification would be required and would be similar to the Palmdale Solar-Gas Hybrid project Condition of Certification for implementation of ZLD technology (see California Energy Commission, 2010). Therefore, staff finds this method of wastewater disposal does not comply with the state's water policies.

Staff concludes that the Project, as proposed by applicant, does not comply with the state's water policies as detailed above. While using poor quality water, and possibly the worst quality water reasonably available for the purposes of the project, the proposed project fails to use the least amount of water available. Staff believes the

applicant has not demonstrated that dry cooling is environmentally undesirable or economically unsound, especially in the light of parallel applications in the same region for dry cooled solar power plants. Therefore, staff recommends that the Commission adopt Condition of Certification **SOIL&WATER-18**, that requires the applicant to submit a Water Conservation Plan that outlines the actions necessary to bring the project cooling water use into compliance with the water policies. Staff suggested working with the applicant between the publication of this SA and the RSA to develop the details of the Water Conservation Plan, but the applicant did not participate in any such discussions. Specific options staff proposed include:

1. Dry-cooling or hybrid cooling systems;

2. Use of a ZLD system;

3. Increasing water use efficiency through project design changes such as increasing cycles of concentration for the evaporative cooling processes;

4. Payment for irrigation improvements in Palo Verde Irrigation District;

5. Purchase of water rights within the Colorado River Basin that will be held in reserve;

6. Funding of Tamarisk removal; and,

7. Other water conserving activities in the Colorado River Basin.

As a result of the lack of the applicant's interest in developing a Water Conservation Plan, staff has drafted a Condition of Certification that identifies the types of activities the applicant could take to ensure the project's conformity with state water policy. The condition requires the Water Conservation Plan to identify the details and descriptions of these activities, including:

A. Feasibility studies and costs;

B. Identification of the activity and water source, and the quantity of basin water that would be conserved;

C. Demonstration of the Project owner's legal entitlement to the water or ability to conduct the activity;

D. Discussion of whether any agency, non-government organization, or private property right holders approval of the identified activities will be needed, and, if so, whether additional approval will require compliance with CEQA;

E. Demonstration of how groundwater will be replaced for each of the activities;

F. An estimated schedule for completion of the activities;

G. Performance measures that would be used to evaluate the amount of water replaced by the activities; and

H. Monitoring and Reporting Plan outlining the steps necessary and proposed frequency of reporting to show the activities are achieving the intended conservation.

C.9.10.3 REGIONAL AND LOCAL

Riverside County Ordinance Code, Title 13, Chapter 13.20 – Water Wells

Section 13-.20.160 Well Logs. This section requires that a report of well excavation for all wells dug or bored for which a permit has been issued be submitted to the Riverside County Department of Environmental Health within sixty (60) days after completion of drilling. DWR Form 188 shall satisfy this requirement as stipulated under California Water Code Section 13571.

Section 13.20.190 Water Quality Standards. This section requires that water from wells that provide water for beneficial use shall be tested radiologically, bacteriologically and chemically as indicated by the Riverside County Department of Environmental Health. Laboratory testing must be performed by a State of California-certified laboratory. The results of the testing shall be provided to the County Department of Environmental Health within ninety (90) days of pump installation.

Section 13.20.220 Well Abandonment. This section provides that all abandoned wells shall be destroyed in such a way that they will not produce water or act as a channel for the interchange of water, and will not present a hazard to the safety and well-being of people or animals. Destruction of any well shall follow requirements stipulated in DWR Bulletin No.74-81, provided that at a minimum the top 50 feet shall be sealed with concrete, or other approved sealing material. Applications for well destruction must be submitted ninety (90) days following abandonment of the well and in accordance with Section 14.08.170.

Section 13.20.240 Declaration of Proposed Reuse. Requires that any well that has not been used for a period of one (1) year shall be properly destroyed unless the owner has filled a “Notice of Intent” with the health officer declaring the well out of service and declaring his intention to use the well again.

Riverside County Ordinance Code, Title 8, Chapter 8.124 - Sewage Discharge

Section 8.124.030, General Requirements for an Approval and Construction Permit. The type, capacity, location, and layout of each private system shall comply with the rules and regulations of the health officer, and the WDRs of the CRBRWQCB. A private system shall be constructed and maintained on the lot which is the site of the building it serves, unless the health officer in his discretion authorizes a different location.

Section 8.124.050 Operation Permits. Each private system shall be managed, cleaned, regulated, repaired, modified and replaced from time to time by the owner or owner’s representatives, in accordance with the rules, regulations and other reasonable requirements of the health officer in conformity with the WDR issued by the regional board and in a manner which will safeguard against and prevent pollution, contamination or nuisance.

Riverside County Title 15 Chapter 15, 24 Uniform Plumbing Code

Section 15.24.010. Adopted by Reference,, Appendix K, Section K1 amended – Private Sewage Disposal – General. In certain areas of the County which have poor soils or

other problems relative to sewage disposal, the sewage disposal system shall be installed and inspected before the building foundation inspection is made.

Section 15.24.010. Adopted by Reference, Appendix K, Section K6(i) amended – Disposal fields. Disposal fields, trenches, and leaching beds shall not be paved over or covered by concrete or any material that can reduce or inhibit any possible evaporation of the sewer effluent unless the area of the disposal fields, trenches, and leaching beds is increased by a minimum of 25 percent.

Riverside County Title 15 Chapter 15.80 Regulating Flood Hazard Areas and Implementing the National Flood Insurance Program

This ordinance was developed to comply with Title 44 CFR Part 65 regarding requirements for the identification and mapping of areas identified as Federal Emergency Management Agency (FEMA) Special Flood Hazard Areas. The ordinance is applicable to development within unincorporated areas of Riverside County and is integrated into the process of application for development permits under other county ordinances including, but not limited to, Ordinance Nos. 348, 369, 457, 460, and 555. When the information required, or procedures involved, in the processing of such applications is not sufficient to assure compliance with the requirements of Chapter 15.80, a separate application must be filed.
Flood insurance rate maps for the Project site or surrounding areas have not been prepared by FEMA. According to the Riverside County General Plan (Riverside County, 2000) the Project site and surrounding lands do not lie within a 100-year or 500-year flood plain.

C.9.11 NOTEWORTHY PUBLIC BENEFITS

No noteworthy public benefits of the proposed Project were identified associated with soil and water resources.

C.9.12 PUBLIC AND AGENCY COMMENTS ON THE PRELIMINARY STAFF ASSESSMENT

CURE Comment:

> "The SA/DEIS concludes that the Project's proposed groundwater pumping may be illegal and will significantly impact the adjudicated Colorado River. The SA/DEIS concludes, "the Project has the potential to divert Colorado River water without any entitlement to the water, and all groundwater production at the site could be considered Colorado River water."
>
> "The Project clearly requires an entitlement prior to any groundwater pumping. However, the SA/DEIS does not identify whether the Project has obtained such an entitlement. Therefore, there is no information regarding whether the Project's proposal to pump groundwater is a reliable water source."

STAFF RESPONSE:

Absent any regulation determining whether the project is extracting Colorado River water, staff has relied on reports from the USGS indicating that the Project is proposing to extract groundwater from a tributary to the Colorado River. The Project thus is potentially impacting the Colorado River which is fully entitled. Staff is treating this as a water resources impact (as opposed to requiring an entitlement) and has developed Conditions of Certification **SOIL&WATER-15** and **SOIL&WATER-19** to address potential impacts to pumping water derived from the Colorado River. As part of the Conditions of Certification, the Project owner will be required to develop and submit a Water Supply Plan that details the source of the offsets. In addition, the Project owner will be required to comply with any future regulations that govern the use of Colorado River water that may be promulgated by the Bureau of Reclamation.

CURE Comment:

> "With respect to significant impacts, the SA/DEIS proposes that the Applicant replace 51,920 acre feet of water that will be pumped from the Colorado River over the life of the Project. However, the SA/DEIS does not identify a replacement water source. The SA/DEIS' proposal for replacement of 51,920 acre feet of water from the Colorado River without identifying a replacement water source fails to satisfy the requirements of CEQA. CEQA requires that the SA/DEIS include an analysis of potential environmental impacts associated with replacing 51,920 acre feet of water. Where mitigation measures would, themselves, cause significant environmental impacts, CEQA requires an evaluation of those secondary (indirect) impacts.[81] Furthermore, before undertaking a project, the lead agency must assess the environmental impacts of all reasonably foreseeable phases and components of a project."
>
> "The SA/DEIS must identify the Applicant's entitlement to Colorado River water for the Project in order to confirm whether groundwater pumping is a reliable source of water for the Project. The SA/DEIS must also fully describe and evaluate all potentially significant impacts associated with the Project's replacement of 51,920 acre feet of water taken from the Colorado River. Any Revised SA that contains this missing information must be circulated for public review and comment."

STAFF RESPONSE:

At the present time, the Project does not require an entitlement. However, staff have conclude that there is a potential indirect CEQA impact to the Colorado River. Conditions of Certification **SOIL&WATER-15** and **SOIL&WATER-19** have been developed to address potential impacts to pumping water derived from the Colorado River. As part of the Conditions of Certification, the Project owner will be required to develop and submit a Water Supply Plan that details the source of the offsets and assesses any impacts with the proposed offsets and required mitigation. In addition, the Project owner will be required to comply with any future regulations that govern the use of Colorado River water that may be promulgated by the Bureau of Reclamation.

CURE Comment:

"The SA/DEIS concludes that evaporation ponds will cause potentially significant impacts to groundwater quality.[136] However, the SA/DEIS does not provide mitigation for the potentially significant impacts. SOILS&WATER-6 states that "conditions to require implementation of waste discharge requirements for LTU and surface impoundments are currently in development...."[137] The SA/DEIS should include specific measures to reduce the significant impacts identified by Because the Project proposes to use groundwater for power plant cooling, the SA/DEIS correctly concludes that the Project does not comply with the State's water policies.[138] Specifically, the Project's proposal to use groundwater fails to "use the least amount of water available"[139] because the Applicant does not propose to use dry cooling even though dry cooling is feasible. The SA/DEIS attempts to reconcile the Project's inconsistency with LORS with Condition of Certification SOIL&WATER-18 which states ***in full***:"
"SOIL&WATER-18 Pending agreement on the actions needed to bring the project into compliance with the water policy.[140]
Clearly, this condition is ***meaningless.*** It provides no information to the public that would enable any meaningful review of the proposed condition."

"The SA/DEIS alludes to future discussions between Staff and the Applicant regarding a panoply of suggestions to bring the Project into compliance with LORS, none of which are analyzed or required in the SA/DEIS. For example, the SA/DEIS suggests dry cooling, hybrid cooling, a ZLD system, project design changes to increase water use efficiency, payment for irrigation improvements, purchase of water rights in the Colorado River, funding of Tamarisk removal, and "other water conserving activities."[141] However, most of these suggestions would fail to ensure that the Project will use the least amount of the worst available water, since dry cooling is feasible for the Project. And, importantly, future discussions – after release of the SA/DEIS – regarding major Project changes and/or mitigation measures mandate that the SA/DEIS be revised and recirculated for public review and comment."

STAFF RESPONSE:

Condition of Certification **SOIL&WATER-6** has been updated along with the inclusion of Appendix B, C, and D that set forth the waste discharge requirements for the LTU and surface impoundments. Staff believes that the requirements specified in the WDRs and **SOIL&WATER-20** will mitigate potential impacts to a less than significant level.

CURE Comment:

"The SA/DEIS also concludes that the Project's proposed groundwater pumping may be illegal and will significantly impact the adjudicated Colorado River. The SA/DEIS states, "the Project has the potential to divert Colorado River water without any entitlement to the water, and all

groundwater production at the site could be considered Colorado River water."

"The Project clearly requires an entitlement prior to any groundwater pumping. However, the SA/DEIS does not identify whether the Project has obtained such an entitlement. Therefore, there is no information regarding whether the Project's proposal to pump groundwater is a reliable water source."

STAFF RESPONSE:

Conditions of Certification **SOIL&WATER-15** and **SOIL&WATER-19** have been developed to address potential impacts to pumping water derived from the Colorado River. As part of the Conditions of Certification, the Project owner will be required to develop and submit a Water Supply Plan that details the source of the offsets. In addition, the Project owner will be required to comply with any future regulations that govern the use of Colorado River water that may be promulgated by the Bureau of Reclamation.

CURE Comment:

"With respect to significant impacts, the SA/DEIS proposes that the Applicant replace 51,920 acre-feet of water that will be pumped from the Colorado River over the life of the Project. However, the Applicant has not identified the water source that will replace 51,920 acre feet of water taken from the Colorado River. The SA/DEIS essentially proposes to replace 51,920 acre feet of Colorado River with nonexistent water. The SA/DEIS' proposal for replacement of 51,920 acre-feet of water from the Colorado River without identifying a replacement water source is vague and uncertain. Thus, impacts to the Colorado River remain significant and unmitigated."

STAFF RESPONSE:

Conditions of Certification **SOIL&WATER-15** and **SOIL&WATER-19** have been developed to address potential impacts to pumping water derived from the Colorado River. As part of the Condition of Certifications, the Project owner will be required to develop and submit a Water Supply Plan that details the source of the offsets. The Colorado River Board of California (CRB) indicated (see letter dated 3/22/2010 to Alan Solomon regarding Palen Solar Power Project) a potential option for obtaining water was through a Section 5 Boulder Canyon Project Act (BCPA) contract holder. The CRB specifically indicated that a potential entity would be the Metropolitan Water District of California.

Lastly, the Project owner will be required to comply with any future regulations that govern the use of Colorado River water that may be promulgated by the Bureau of Reclamation.

C.9.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

This section section presents the mitigation, monitoring, compliance, and reporting measures for Soil and Water Resources. For a summary of all proposed Project impacts and their respective mitigation measures, please see the Impact Summary Tables provided at the end of the Executive Summary.

DRAINAGE EROSION AND SEDIMENTATION CONTROL PLAN (DESCP)

SOIL&WATER-1 Prior to site mobilization, the Project owner shall obtain both the and Compliance Project Manager (CPM) approval of the Drainage Erosion and Sedimentation Control Plan (DESCP) for managing stormwater during Project construction and operations as normally administered by the County of Riverside. The DESCP must ensure proper protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, include provisions for sediment and stormwater retention from both the power block, solar fields and transmission right of way to meet any Riverside County requirements, address exposed soil treatments in the solar fields for both road and non-road surfaces, and identify all monitoring and maintenance activities. The DESCP shall contain, at minimum, the elements presented below that outline site management activities and erosion and sediment-control BMPs to be implemented during site mobilization, excavation, construction, and post construction (operating) activities.

A. Vicinity Map – A map(s), at a minimum scale 1 inch=500 feet, shall be provided indicating the location of all Project elements (construction sites, laydown area, pipelines) with depictions of all significant geographic features including swales, storm drains, and sensitive areas.

B. Site Delineation – All areas subject to soil disturbance for the proposed Project (Project phases, laydown area, all linear facilities, landscaping areas, and any other Project elements) shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, pipelines, roads, and drainage facilities.

C. Watercourses and Critical Areas – The DESCP shall show the location of all nearby watercourses including swales, storm drains, and drainage ditches. It shall indicate the proximity of those features to the proposed Project construction, laydown, and landscape areas and all transmission and pipeline construction corridors.

a. The DESCP shall describe how the project will avoid or minimize impacts to Palen-McCoy Valley sand corridor,

b. All proposed linear features (with the exception of Power Pylons) shall be constructed flush with the surrounding ground surface and without ground level obstructions.

D. **Drainage Map** – The DESCP shall provide a topographic site map(s), at a minimum scale of 1 inch=200 feet, showing existing, interim, and proposed drainage swales and drainage systems and drainage-area boundaries. On the map, spot elevations are required where relatively flat conditions exist. The spot elevations and contours shall be extended off site for a minimum distance of 100 feet.

E. **Drainage of Project Site Narrative** – The DESCP shall include a narrative of the drainage measures necessary to protect the site and potentially affected soil and water resources within the drainage downstream of the site. The narrative shall include the summary pages from the hydraulic analysis prepared by a professional engineer and erosion control specialist. The narrative shall state the watershed size(s) in acres that was used in the calculation of drainage features.

F. **Clearing and Grading Plans** – The DESCP shall provide a delineation of all areas to be cleared of vegetation and areas to be preserved. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross sections, or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography shall be illustrated by tying in proposed contours with existing topography.

G. **Clearing and Grading Narrative** – The DESCP shall include a table with the estimated quantities of material excavated or filled for the site and all Project elements (Project site, laydown area, transmission and pipeline corridors, roadways, and bridges) whether such excavation or fill is temporary or permanent, and the amount of such material to be imported or exported.

H. **Soil Wind and Water Erosion Control -** The plan shall address exposed soil treatments to be used during construction and operation of the proposed Project for both road and non-road surfaces including specifically identifying all chemical based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed Project site that would not cause adverse effects to vegetation. BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by the CPM prior to use.

I. **Best Management Practices Plan –** The DESCP shall identify on the topographic site map(s) the location of the site specific BMPs to be employed during each phase of construction (initial grading, Project element excavation and construction, and final grading/stabilization). BMPs shall include measures designed to control dust, stabilize construction access roads and entrances, and control storm water runoff and sediment transport.

J. **Best Management Practices Narrative –** The DESCP shall show the location (as identified in (I) above), timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during all Project element (site, pipelines) excavations and construction, final grading/stabilization, and operation. Separate BMP implementation schedules shall be provided for each Project element for each phase of construction. The maintenance schedule shall include post-construction maintenance of structural-control BMPs, or a statement provided about when such information would be available.

K. **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.

L. **Erosion Control Drawings –** The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion control specialist.

M. **Agency Comments –** The DESCP shall include copies of recommendations, conditions, and provisions from the California Department of Fish and Game (CDFG) and Colorado River Basin Regional Water Quality Control Board (CRBRWQCB).

N. **Monitoring Plan:** Monitoring activities shall include routine measurement of the volume of accumulated sediment in the onsite drainage ditches, and storm water diversions. The monitoring plan shall be part of the Channel Monitoring and Maintenance Plan, **SOIL&WATER-13**.

Verification: No later than thirty (30) days prior to start of site mobilization, the Project owner shall submit a copy of the final DESCP to the CPM for review and comment and to the County of Riverside and the CRBRWQCB if required. The CPM shall consider comments if received by the county and CRBRWQCB before approval of the DESCP.

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. The Project owner shall provide in the monthly compliance report with a narrative on the effectiveness of the drainage, erosion, and sediment-control measures and the results of monitoring and maintenance activities. Once operational, the Project owner shall update and maintain the DESCP for the life of the Project and shall provide in the annual compliance report information on the results of monitoring and maintenance activities.

GROUNDWATER LEVEL MONITORING, MITIGATION, AND REPORTING

SOIL&WATER-2 The Project owner shall submit a Groundwater Level Monitoring and Reporting Plan to the CPM for review and approval. The Groundwater

Level Monitoring and Reporting Plan shall provide detailed methodology for monitoring background and site groundwater levels. Monitoring shall include pre-construction, construction, and Project operation water use. 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 wells and near potentially impacted existing wells.

The Project owner shall:

A. Prior to Project Construction

1. A well reconnaissance shall be conducted to investigate and document the condition of existing water supply wells located within 10 miles of the project site, provided that access is granted by the well owners. The reconnaissance will include sending notices by registered mail to all property owners within a 10 mile radius of the project area.

2. Monitor to establish preconstruction conditions. The monitoring plan and network of monitoring wells will make use of the two test wells and observation wells installed during the Groundwater Resources Investigation completed by the applicant (WPAR, 2010) and any monitoring wells that are installed to comply with Waste Discharge Requirements issued by the RWQCB for the evaporation ponds and land treatment unit associated with the Project. In addition, up to four additional existing wells in the basin that are located up to 10 miles from the Project site (if wet cooling is utilized) or 2 miles (if dry cooling is utilized) will be incorporated into the program, provided access is granted by the owners and that the wells are deemed to be of suitable location and construction to satisfy the requirements for the monitoring program. The off-site wells incorporated in the program will include both shallower wells completed above the pumped interval and deeper wells completed within the pumped interval. The monitoring plan shall also include the identification of any seeps and or springs within one mile of the perimeter of the project site. The seeps and or springs shall be included in the groundwater level monitoring network.

3. Collect groundwater levels from the off-site and on-site wells, seeps and or springs to provide initial groundwater levels for both on-site and off-site wells.

4. Map groundwater levels within the CVGB within 10 miles of the site from the groundwater data collected prior to construction. Update trend plots and statistical analyses, as data is available.

B. During Construction:

1. Collect water levels within the monitoring network and seeps and or springs on a quarterly basis throughout the construction period and at the end of the construction period. In addition, collect continuous water level measurements from two shallow (water table) wells at the site

using recording pressure transducers. Perform statistical trend analysis for water levels data. Assess the significance of an apparent trend and estimate the magnitude of that trend. Use pressure transducer data to characterize seasonal and diurnal fluctuations in groundwater levels.

C. During Operation:

1. On a quarterly basis for the first year of operation and semi-annually thereafter for the following four years, collect water level measurements from any wells and seeps and or springs identified in the groundwater monitoring program to evaluate operational influence from the Project. In addition, collect continuous water level measurements from two shallow (water table) wells at the site using recording pressure transducers. Quarterly operational parameters (i.e., pumping rate) of the water supply wells shall be monitored. Additionally, quarterly groundwater-use in the eastern CVGB shall be estimated based on available data.

2. On an annual basis, perform statistical trend analysis for water levels and comparison to predicted water level declines due to project pumping. Analysis of the significance of an apparent trend shall be determined and the magnitude of that trend estimated. Use the pressure transducer data to characterize seasonal and diurnal fluctuations in groundwater levels. Based on the results of the statistical trend analyses and comparison to predicted water level declines due to Project pumping, the Project owner shall determine the area where the Project pumping has induced a drawdown in the water supply at a level of 5 feet or more below the baseline trend.

3. If water levels have been lowered more than 5 feet below pre-site operational trends, and monitoring data provided by the Project owner show these water level changes are different from background trends or influences by other groundwater pumpers and are caused by Project pumping, then the Project owner shall provide mitigation to the well owner(s) if impacted. Mitigation shall be provided to the impacted well owners that experience 5 feet or more of Project-induced drawdown if the CPM's inspection of the well monitoring data confirms the drawdown (or a portion thereof) is the result of Project-related changes to water levels and water level trends relative to measured pre-project water levels, and the well yield or performance has been significantly affected by Project pumping. The type and extent of mitigation shall be determined by the amount of water level decline induced by the Project, the type of impact, and site specific well construction and water use characteristics. If an impact is determined to be caused by drawdown from more than one source, the level of mitigation provided shall be proportional to the amount of drawdown induced by the Project relative to other sources. In order to be eligible, a well owner must provide documentation of the well location and construction, including pump intake depth, and that the well was constructed and

usable before Project pumping was initiated. The mitigation of impacts shall be determined as follows:

a. If Project pumping has lowered water levels and increased pumping lifts, increased energy costs shall be calculated. Payment or reimbursement for the increased costs shall be provided at the option of the affected well owner on an annual basis. In the absence of specific electrical use data supplied by the well owner, the Project owner shall use **SOIL&WATER-3** to calculate increased energy costs.

b. If groundwater monitoring data indicate Project pumping has lowered water levels below the top of the well screen, and the well yield is shown to have decreased by 10 percent or more of the initial yield, compensation shall be provided for the diagnosis and maintenance to treat and remove encrustation from the well screen. Reimbursement shall be provided at an amount equal to the customary local cost of performing the necessary diagnosis and maintenance for well screen encrustation. Should well yield reductions be reoccurring, the Project owner shall provide payment or reimbursement for either periodic maintenance throughout the life of the Project or, if treatment is anticipated to be required more frequently than every 3-5 years, replacement of the well.

c. If Project pumping has lowered water levels to significantly impact well yield so that it can no longer meet its intended purpose, causes the well to go dry, or cause casing collapse, payment or reimbursement of an amount equal to the cost of deepening or replacing the well shall be provided to accommodate these effects. Payment or reimbursement shall be at an amount equal to the customary local cost of deepening the existing well or constructing a new well of comparable design and yield (only deeper). The demand for water, which determines the required well yield, shall be determined on a per well basis using well owner interviews and field verification of property conditions and water requirements compiled as part of the pre-project well reconnaissance. Well yield shall be considered significantly impacted if it is incapable of meeting 110 percent of the well owner's maximum daily demand, dry-season demand, or annual demand – assuming the pre-project well yield documented by the initial well reconnaissance met or exceeded these yield levels. For already low-yielding wells identified prior to Project construction, a reduction due solely to Project pumping of 10 percent or more below the pre-project yield shall be considered a significant impact. The contribution of Project pumping to observed decreases in observed well yield shall be determined by interpretation of the groundwater monitoring data collected and shall take into consideration the effect of other nearby pumping and the condition of the well prior to the commencement of project pumping.

d. The Project owner shall notify any owners of the impacted wells within one month of CPM approval of the compensation analysis for increased energy costs.

e. Pump lowering – In the event that groundwater is lowered as a result of Project pumping to an extent where pumps are exposed but well screens remain submerged the pumps shall be lowered to maintain production in the well. The Project shall reimburse the impacted well owner for the costs associated with lowering pumps in proportion to the Project's contribution to the lowering of the groundwater table that resulted in the impact..

f. Deepening of wells – If the groundwater is lowered enough as a result of Project pumping that well screens and/or pump intakes are exposed, and pump lowering is not an option such affected wells shall be deepened or new wells constructed. The Project shall reimburse the impacted well owner for all costs associated with deepening existing wells or constructing new wells in proportion to the Project's contribution to the lowering of the water table that resulted in the impact.

4. After the first five-year operational and monitoring period the CPM shall evaluate the data and determine if the monitoring program water level measurement frequencies should be revised or eliminated. Revision or elimination of any monitoring program elements shall be based on the consistency of the data collected. The determination of whether the monitoring program should be revised or eliminated shall be made by the CPM.

5. At the end of every subsequent five-year monitoring period, the collected data shall be evaluated by the CPM and they shall determine if the sampling frequency should be revised or eliminated.

6. During the life of the Project, the Project owner shall provide to the CPM all monitoring reports, complaints, studies and other relevant data within ten (10) days of being received by the Project owner.

Verification: The Project owner shall do all of the following:

1. At least thirty (30) days prior to Project construction, the Project owner shall submit to the CPM, a comprehensive report presenting all the data and information required in item A above.

2. The Project owner shall submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

3. During Project construction, the Project owner shall submit to the CPM quarterly reports presenting all the data and information required in item B above.

4. The Project owner shall submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

5. No later than sixty (60) days after commencing Project operation, the Project owner shall provide to the CPM for review and approval, documentation showing that any mitigation to private well owners during Project construction was satisfied, based on the requirements of the property owner as determined by the CPM.

6. During Project operation, the Project owner shall submit to the CPM, applicable quarterly, semi-annual and annual reports presenting all the data and information required in item C above. Quarterly reports shall be submitted to the CPM thirty (30) days following the end of the quarter. The 4th quarter report shall serve as the annual report, and will be provided on January 31 in the following year.

7. The Project owner shall submit to the both the CPM all calculations and assumptions made in development of report data and interpretations, calculations, and assumptions used in development of any reports.

8. The Project owner shall provide mitigation as described in item 3.c above, if the CPM's inspection of the monitoring information confirms Project-induced changes to water levels and water level trends relative to measured pre-project water levels, and well yield has been lowered by Project pumping. The type and extent of mitigation shall be determined by the amount of water level decline and site specific well construction and water use characteristics. The mitigation of impacts will be determined as set forth in item 3.c above.

9. If mitigation includes monetary compensation, the Project owner shall provide documentation to the CPM that compensation payments have been made by March 31 of each year of Project operation or, if lump-sum payment are made, payment is made by March 31 following the first year of operation only. Within thirty (30) days after compensation is paid, the Project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

10. After the first five year operational and monitoring period, the Project owner shall submit a 5-year monitoring report to the CPM that submits all monitoring data collected and provides a summary of the findings. The CPM will determine if the water level measurement frequencies should be revised or eliminated.

SOIL&WATER-3: Where it is determined that the Project owner shall reimburse a private well owner for increased energy costs identified as a result of analysis performed in Condition of Certification **SOIL&WATER-5,** the Project owner shall calculate the compensation owed to any owner of an impacted well as described below.

<u>Increased cost for energy</u>	= change in lift/total system head x total energy consumption x costs/unit of energy
Where:	
change in lift (ft)	= calculated change in water level in the well resulting from project
total system head (ft)	= elevation head + discharge pressure head

elevation head (ft) = difference in elevation between wellhead discharge pressure gauge and water level in well during pumping.

discharge pressure head (ft) = pressure at wellhead discharge gauge (psi) X 2.31

The Project owner shall submit to the CPM for review and approval the documentation showing which well owners must be compensated for increased energy costs and that the proposed amount is sufficient compensation to comply with the provisions of this condition.

- Any reimbursements (either lump sum or annual) to impacted well owners shall be only to those well owners whose wells were in service within six months of the Commission decision and within a 3-mile radius of the project site.
- The Project owner shall notify all owners of the impacted wells within one month of the CPM approval of the compensation analysis for increase energy costs.
- Compensation shall be provided on either a one-time lump-sum basis, or on an annual basis, as described below.

Annual Compensation: Compensation provided on an annual basis shall be calculated prospectively for each year by estimating energy costs that will be incurred to provide the additional lift required as a result of the project. With the permission of the impacted well owner, the Project owner shall provide energy meters for each well or well field affected by the project. The impacted well owner to receive compensation must provide documentation of energy consumption in the form of meter readings or other verification of fuel consumption. For each year after the first year of operation, the Project owner shall include an adjustment for any deviations between projected and actual energy costs for the previous calendar year.

One-Time Lump-Sum Compensation: Compensation provided on a one-time lump-sum basis shall be based on a well-interference analysis, assuming the maximum project-pumping rate of 600 afy. Compensation associated with increased pumping lift for the life of the project shall be estimated as a lump sum payment as follows:

- The current cost of energy to the affected party considering time of use or tiers of energy cost applicable to the party's billing of electricity from the utility providing electric service, or a reasonable equivalent if the party independently generates their electricity;
- An annual inflation factor for energy cost of 3 percent; and
- A net present value determination assuming a term of 30 years and a discount rate of 9 percent;

Verification: The Project owner shall do all of the following:

1. No later than thirty (30) days after CPM approval of the well drawdown analysis, the Project owner shall submit to the CPM for review and approval all documentation

and calculations describing necessary compensation for energy costs associated with additional lift requirements.

2. The Project owner shall submit to the CPM all calculations, along with any letters signed by the well owners indicating agreement with the calculations, and the name and phone numbers of those well owners that do not agree with the calculations.

Compensation payments shall be made by March 31 of each year of project operation or, if lump-sum payment is selected, payment shall be made by March 31 of the first year of operation only. Within thirty (30) days after compensation is paid, the Project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

PROJECT GROUNDWATER WELLS, PRE-WELL INSTALLATION

SOIL&WATER-4 The Project owner proposes to construct and operate up to two or more onsite groundwater production wells that produce water from the CVGB. The Project owner shall ensure that the wells are completed in accordance with all applicable state and local water well construction permits (see C.9.9.2) and requirements. Prior to initiation of well construction activities, the Project owner shall submit for review and comment a well construction packet to the County of Riverside and fees normally required for the county's well permit, with copies to the CPM. The Project shall not construct a well or extract and use groundwater until the CPM provides approval to construct and operate the well.

Post-Well Installation. The Project owner shall provide documentation to the CPM that the well has been properly completed. In accordance with California's Water Code section 13754, the driller of the well shall submit to the DWR a Well Completion Report for each well installed. The Project owner shall ensure the Well Completion reports are submitted. The Project owner shall ensure compliance with all county water well standards and requirements for the life of the wells and shall provide the CPM with two (2) copies each of all monitoring or other reports required for compliance with the County of Riverside water well standards and operation requirements, as well as any changes made to the operation of the well.

Verification: The Project owner shall do all of the following:

A. No later than sixty (60) days prior to the construction of the onsite groundwater production wells, the Project owner shall submit to the CPM a copy of the water well construction packet submitted to the County of Riverside.

B. No later than thirty (30) days prior to the construction of the onsite groundwater production wells, the Project owner shall submit a copy of written concurrence received from the County of Riverside that the proposed well construction activities comply with all county well requirements and meet the requirements established by the county's water well permit program.

C. No later than sixty (60) days after installation of each well at the Project site, the Project owner shall ensure that the well driller submits a Well Completion Report to the DWR with a copy provided to the CPM. The Project owner shall submit to the

CPM, together with the Well Completion Report, a copy of well drilling logs, water quality analyses, and any inspection reports.

D. During well construction and for the operational life of the well, the Project owner shall submit two (2) copies each to the CPM of any proposed well construction or operation permit changes within ten (10) days of submittal to or receipt from the County of Riverside.

E. No later than fifteen (15) days after completion of the onsite groundwater production wells, the Project owner shall submit documentation to the CPM, and the CRBRWQCB that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any onsite drilling sumps used for Project drilling activities were removed in compliance with 23 CCR section 2511(c).

CONSTRUCTION AND OPERATION WATER USE

SOIL&WATER-5 The Project owner proposes to use groundwater for water supply during construction and during operation. The proposed Project's use of groundwater during construction shall not exceed an annual average of 1,368 afy during the entire construction period and an annual average of 1,605 afy during operation for wet cooling and 202 afy for dry cooling. Water quality used for project construction and operation will be reported in accordance with Condition of Certification **SOIL&WATER-20** to ensure compliance with this condition.

Prior to the use of groundwater for construction, the Project owner shall install and maintain metering devices as part of the water supply and distribution system to document Project water use and to monitor and record in gallons per day the total volume(s) of water supplied to the Project from this water source. The metering devices shall be operational for the life of the Project.

Verification: 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 and monthly average of daily water usage in gallons per day.

The Project owner shall prepare an annual summary, which will include monthly range and monthly average of water usage in gallons per month, and total water used on an annual basis in acre-feet. 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.

WASTE DISCHARGE REQUIREMENTS

SOIL&WATER-6: The Project owner shall comply with the requirements specified in Appendix B, C, and D. These requirements relate to discharges, or potential discharges, of waste that could affect the quality of waters of the state, and were developed in consultation with staff of the State Water Resources Control Board and/or the applicable California Regional Water Quality Control Board (hereafter "Water Boards"). It is the Commission's intent that these requirements be enforceable by both the Commission and the Water Boards. In furtherance of that objective, the Commission hereby delegates the enforcement of these requirements, and associated monitoring, inspection and annual fee collection authority, to the Water Boards. Accordingly, the Commission and the Water Board shall confer with each other and coordinate, as needed, in the enforcement of the requirements. The Project owner shall pay the annual waste discharge permit fee associated with this facility to the Water Boards. In addition, the Water Boards may "prescribe" these requirements as waste discharge requirements pursuant to Water Code Section 13263 solely for the purposes of enforcement, monitoring, inspection, and the assessment of annual fees, consistent with Public Resources Code Section 25531, subdivision (c)

Verification: No later than sixty (60) days prior to any wastewater or storm water discharge or use of land treatment units, the Project owner shall provide documentation to the CPM, with copies to the CRBWQCB, demonstrating compliance with the WDRs established in Appendices C, D, and E. Any changes to the design, construction, or operation of the evaporation basins, treatment units, or storm water system shall be requested in writing to the CPM, with copies to the CRBWQCB, and approved by the CPM, in consultation with the CRBWQCB, prior to initiation of any changes. The Project owner shall provide to the CPM, with copies to the CRBWQCB, all monitoring reports required by the WDRs, and fully explain any violations, exceedances, enforcement actions, or corrective actions related to construction or operation of the evaporation basins, treatment units, or storm water system.

SEPTIC SYSTEM AND LEACH FIELD REQUIREMENTS

SOIL&WATER-7 The Project owner shall comply with the requirements of the County of Riverside Ordinance Code Title 8, Chapter 8.124 and the California Plumbing Code (California Code of Regulations Title 24, Part 5) regarding sanitary waste disposal facilities such as septic systems and leach fields. The septic system and leach fields shall be designed, operated, and maintained in a manner that ensures no deleterious impact to groundwater or surface water. Compliance shall include an engineering report on the septic system and leach field design, operation, maintenance, and loading impact to groundwater.

Verification: The Project owner shall submit all necessary information and the appropriate fee to the County of Riverside to ensure that the project has complied with county sanitary waste disposal facilities requirements. Written assessments prepared by the County of Riverside regarding the project's compliance with these requirements

must be submitted to the CPM for review and approval thirty (30) days prior to the start of power plant operation.

REVISED PROJECT DRAINAGE REPORT AND PLANS

SOIL&WATER-8 The Project owner shall provide a revised Drainage Report which includes the following additional information:

A. Calculations for all the collector/conveyance channels and onsite drainage channels showing adequate depth and non-erosive velocities. Data provided shall include depth, velocity, Froude number and other relevant hydraulic parameters.

B. Detailed scour calculations to justify toe-down depths for all soil cement segments, drop structures, slope protection, and any other features where scour is an issue.

C. Post development onsite drainage maps, calculations and discussion which include a delineation of all onsite watersheds with basin areas, points of concentration, and peak discharge values where the smaller onsite channels discharge into the larger collector and conveyance channels. The maps should also show peak flow values at all downstream points of discharge from the Project.

D. A discussion and associated calculations documenting the methods to be used for erosion control at outlet locations along the southern property boundary where flow is released to existing ground.

E. A specific discussion of how the proposed onsite drainage design will protect the facility from erosion and the possible failure of the facilities resulting in a release of HTF.

F. Stage-discharge rating calculations for all outlet structures (i.e. pipes and weirs) used to outlet water along the southern project boundary.

G. Digital copies of all hydrologic and hydraulic analysis.

The Project owner shall also provide the 30 percent Grading and Drainage Plans which include the design based on information provided in the revised Drainage Report outlined above.

Verification: The Project owner shall submit a Revised Project Drainage Report with the 30 percent Grading and Drainage Plans to the CPM for their review and comments sixty (60) days before project mobilization. The owner will address comments provided by the CPM until approval of the report is issued. All comments and concepts presented in the approved Revised Project Drainage Report with the 30 percent Grading and Drainage Plans will be included in the final Grading and Drainage Plans.

DETAILED FLO-2D ANALYSIS

SOIL&WATER-9 The Project owner shall provide a revised FLO-2D analysis which models the post-development flood conditions for the 10-, 25- and 100-year storm events along the southern project boundary where flow is released to existing ground. The post-development model must include all outlet structure in the model with appropriate elevations and stage-discharge data. The methods and results of the analysis must be fully documented in the revised Project Drainage Report required in **SOIL&WATER-8**. Graphical output must include depth and velocity mapping for the post-development condition. Color shading schemes used for the mapping must be consistent between all maps as well as clear and easily differentiated between designated intervals for hydraulic parameters. Intervals to be used in the mapping are as follows:

- Flow Depth: at 0.20 ft intervals up to 1 ft, and 0.40 ft intervals thereafter.
- Velocity: 0.5 feet per second (ft/s) intervals

A set of figures will be provided for the 10-, 25- and 100-year events at a scale of no less than 1 in=200 ft which show the extent, depths and velocities of flows being discharged along the southern property boundary, as well as annotation indicating the location and type of outlet structure. Digital input and output files associated with the FLO-2D analysis must be included with all submittals.

The results of this analysis will be used to ensure a design where flow is released from the southern channel in a manner which reasonably mimics existing conditions with respect to flow depth and velocity, and does not result in erosion downstream of the facility.

Verification: The Project owner shall submit a detailed FLO-2D analysis to the CPM for their review and comments with the 30 percent Grading and Drainage Plans and revised Project Drainage Report required in **SOIL&WATER-8**. The Project owner will address comments provided by the CPM until approval of the analysis is issued.

DRAINAGE CHANNEL DESIGN

SOIL&WATER-10 All collector and conveyance channels shall be constructed consistent with Riverside County Flood Control and Water Conservation District (RCFCWCD) guidelines where applicable. Deviation from those guidelines should be documented in the Project drainage report along with justification. Grade control structures shall be utilized where needed to meet channel velocity and Froude number requirements. Channels shall be sized along discreet sections based on the results of the detailed FLO-2D analysis described in **SOIL&WATER-9**. All grade control and drop structures shall have adequate toe-down to account for the design drop plus two additional feet to account for potential downcutting of the channel over time.

Channel confluence design must be given special consideration, especially as the preliminary Grading and Drainage Plans show 90 degree angles of

confluence at nearly all locations. The issues of confluence hydraulics and potential scour shall be specifically addressed in the revised Drainage Report.

Offsite flows shall discharge directly into collector channels following the natural drainage patterns. The Project owner shall also flatten constructed channel side slopes at a 4:1 ratio at all locations where adequate space exists and in no cases are slopes to be steeper than 3:1along reaches requiring soil cement. At slopes of 3:1, soil cement shall be placed in horizontal lifts.

The proposed collector channel design must be fully documented in the Grading and Drainage plans and must include the following information:

A. Detailed and accurate cut/fill lines demonstrating in plan view how the channel would tie into existing grade and the solar facility.

B. Channel cross-sections at 200-foot intervals or any major changes in channel configuration showing the channel geometry, existing grade, proposed grade at the facility and how the channel would tie in at on both sides.

C. Detailed channel profiles showing existing and finished grades at channel flow line and left and right banks. All drop structures as well as the toe-of soil cement profile must also be shown and fully annotated. The 100-year water surface elevation will be provided on all profiles.

D. Typical sections and design details for all discreet channel sections, drop structures, channel confluences, flow dispersion structures and other relevant drainage features.

E. Details for all outlet structures to be used along the downstream property boundary to release flow from the engineered channels to existing ground as well as details and specifications for all erosion protection measures to be used at those locations.

F. Consistent nomenclature and stationing on all plans, sections, profiles and details.

Verification: The Project owner shall prepare preliminary, 30 percent channel design drawings and submit two (2) copies for the CPM review and comment. The preliminary design drawings shall be submitted at the same time as the Revised Project Drainage Report in **SOIL&WATER-8** and FLO 2D Analysis in **SOIL&WATER-9**. The Project owner will update and modify the design as necessary to obtain CPM approval.

CHANNEL EROSION PROTECTION

SOIL&WATER–11 The Project owner must provide revised preliminary Grading and Drainage Plans which incorporate the items and information as listed below for the channels designated as A, B, C, D, E, B/C, D/E on the Conceptual Grading Plans (GSEP 2010a).

A. Soil cement bank protection must be provided such that the channels are protected from bank erosion and lateral headcutting. The extents of the proposed bank protection must be shown on the revised Grading and Drainage Plans. Typical sections for these channels must show the layout of the bank protection including thickness, width and toe-down location and depth consistent with the scour calculation provided in the revised Drainage Report.

B. Soil cement bank protection shall be provided on both channel banks wherever 10-year channel flow velocity exceeds 5 ft/s. It shall be provided on the outer channel bank wherever offsite topography and a detailed FLO-2D analysis indicate surface flow would enter the collector channels.

C. Soil cement bank protection shall be provided at all channel confluences of otherwise unlined channels where the result of the detailed hydraulic analysis presented in the revised Drainage Report indicate the increased potential for erosion due to adverse angles of confluence. Detailed plans for each confluence showing the extents of the soil cement based on specific hydraulic conditions shall be provided in the formal Grading and Drainage Plans.

D. Other methods of channel stabilization, such as dumped riprap or gabions, will not be permitted. Bio-stabilization measures are not permitted.

E. Earthen berms used on the outside of collector channels to guide flow to discreet points of discharge into a channel shall not be utilized in lieu of soil cement on the outside bank of collector channels. Offsite flows shall discharge directly into collector channels.

F. The plans shall include reference to regionally accepted specifications for soil cement production and construction. A copy of the specification must be submitted with the revised plans.

G. A soils report indicating the suitability of the Project soils for use in the production of soil cement to the Project specifications shall be submitted with the revised Grading and Drainage Plans.

H. The bottom of engineered collector channels may be left earthen or fully lined at the discretion of the engineer. Fully lined channels will have higher allowable velocities and Froude numbers assuming hydraulic jumps are modeled and considered in the channel design.

I. If modifications to the existing drainages to allow construction of and future access to linear facilities require stabilization of the channel in the

vicinity of those modifications, location of disturbance to the existing drainages shall be stabilized consistent with best engineering practice to eliminate future negative impacts to those drainages upstream and downstream of the linear facility in the form of downcutting, erosion and headcutting. The use of “non-engineered” culvert crossings shall not be allowed. All structures to be utilized in existing drainages along linear facilities shall be documented in the project drainage report and reflected in the project improvement plans. Channel erosion mitigation measures along linear facilities shall be subject to all the requirements of this Condition of Certification where applicable.

Verification: The required information and criteria shall be incorporated into the Grading and Drainage Plans and with all subsequent submittals as required in **SOIL&WATER-8** through **SOIL&WATER-10**. The Project owner will update and modify the design as necessary to obtain CPM approval.

NON-TRANSIENT, NON-COMMUNITY WATER SYSTEM

SOIL&WATER-12: The Project is subject to the requirement of Title 22, Article 3, Sections 64400.80 through 64445 for a non-transient, non-community water system (serving 25 people or more for more than six months). In addition, the system will require periodic monitoring for various bacteriological, inorganic and organic constituents.

The Project owner shall designate a California Certified Water Treatment Plant Operator as well as the technical, managerial and financial requirements as prescribed by State law. The Project owner will supply updates on an annual basis of monitoring requirements, any submittals to County of Riverside as well and proof of annual renewal of the operating permit. Pursuant to this requirement, the Project owner shall obtain a permit from the County of Riverside to operate a non-transient, non-community water system.

Verification: The Project owner shall obtain a permit to operate a non-transient, non-community water system with the County of Riverside at least sixty (60) days prior to commencement of operations at the site. The Project owner shall supply updates annually for all monitoring requirements and submittals to County of Riverside related to the permit, and proof of annual renewal of the operating permit.

CHANNEL MAINTENANCE PROGRAM

SOIL&WATER-13: The Project owner shall develop and implement a Channel Maintenance Program that provides long-term guidance to implement routine channel maintenance projects and comply with conditions of certification in a feasible and environmentally-sensitive manner. The Channel Maintenance Program will be a process and policy document prepared by the Project owner, reviewed by the CPM. The Project owner shall supervise the implementation of a Channel Maintenance Program in accordance with conditions of certification.

The Channel Maintenance Program shall include the following:

A. **Purpose and Objectives** – Establishes the main goals of the Program, of indefinite length, to maintain the diversion channel to meet its original design to provide flood protection, support Project mitigation, protect wildlife habitat and movement/ migration, and maintain groundwater recharge.

B. **Application and Use** - The channel maintenance work area is defined as the Project engineered channel, typically extending to the top of bank, include access roads, and any adjacent property that Project owns or holds an easement for access and maintenance. The Program would include all channel maintenance as needed to protect the Project facilities and downstream property owners.

C. **Channel Maintenance Activities**

1. **Sediment Removal** - sediment is removed when it: (1) reduces the diversion channel effective flood capacity, to less than the design discharge, (2) prevents appurtenant hydraulic structures from functioning as intended, and (3) becomes a permanent, non-erodible barrier to instream flows.

2. **Vegetation Management** - Vegetation management shall include control of invasive or nonnative vegetation as prescribed in Condition of Certification **BIO-14**.

3. **Bank Protection and Grade Control Repairs** – Bank protection and grade control structure repairs involve any action by the Project owner to repair eroding banks, incising toes, scoured channel beds, as well as preventative erosion protection. The Project owner would implement instream repairs when the problem: (1) causes or could cause significant damage to Project; adjacent property, or the structural elements of the diversion channel; (2) is a public safety concern; (3) negatively affects groundwater recharge; or (4) negatively affects the mitigation vegetation, habitat, or species of concern.

4. **Routine Channel Maintenance** - trash removal and associated debris to maintain channel design capacity; repair and installation of fences, gates and signs; grading and other repairs to restore the original contour of access roads and levees (if applicable); and removal of flow obstructions at Project storm drain outfalls.

5. **Channel Maintenance Program –** Exclusions including: emergency repair and CIP.

D. **Related Programmatic Documentation** –the CPM will review and approve the Channel Maintenance Program programmatic documentation. Maintenance activities shall comply with the stream alteration agreement provisions and requirements for channel maintenance activities consistent

with California's endangered species protection regulations and other applicable regulations.

E. Channel Maintenance Process Overview

1. **Program Development and Documentation** – This documentation provides the permitting requirements for channel maintenance work in accordance with the conditions of certification for individual routine maintenance of the engineered channel without having to perform separate CEQA/NEPA review or obtain permits. The Project owner shall supervise the implementation of a Channel Maintenance Program in accordance with conditions of certification.

2. **Maintenance Guidelines** - based on two concepts: (1) the maintenance standard and (2) the acceptable maintenance condition, and applies to sediment removal, vegetation management, trash and debris collection, blockage removal, fence repairs, and access road maintenance.

3. **Implementation** – Sets Maintenance Guidelines for vegetation and sediment management. Project's vegetation management activities are established in Condition of Certification **BIO-14**. Maintenance Guidelines for sediment removal provide information on the allowable depth of sediment for the engineered channel that would continue to provide design discharge protection.

4. **Reporting** –the CPM requires the following reports to be submitted each year as part of the Annual Compliance Report:

   a. Channel Maintenance Work Plan - Describes the planned "major" maintenance activities and extent of work to be accomplished; and

   b. Channel Maintenance Program Annual Report – Specifies which maintenance activities were completed during the year including type of work, location, and measure of the activity (e.g. cubic yards of sediment removed).

   c. A report describing "Lessons Learned" to evaluate the effectiveness of both resource protection and maintenance methods used throughout the year.

F. Resource Protection Policies - establishes policies to ensure that resources would be protected to the fullest extent feasible during routine channel maintenance activities. Policies would be developed to guide decision-making for channel maintenance activities. BMPs shall be developed to implement these policies.

In addition, the Project owner shall:

- Supervise the implementation of a Channel Maintenance Program in accordance with conditions of certification;

- Ensure the Project Construction and Operation Managers receive training on the Channel Maintenance Program;

As part of the Project Annual Compliance Report to the CPM , submit a Channel Maintenance Program Annual Report specifying which maintenance activities were completed during the year including type of work, location, and measure of the activity (e.g. cubic yards of sediment removed).

Verification: At least sixty (60) days prior to the start of any project-related activities (not including linears), the Project owner shall coordinate with the CPM to develop the Channel Maintenance Program. The Project owner shall submit two copies of the programmatic documentation, describing the proposed Channel Maintenance Program, to the CPM (for review and approval). The Project owner shall provide written notification that they plan to adopt and implement the measures identified in the approved Channel Maintenance Program.

CLOSURE AND DECOMMISSIONING PLAN

SOIL&WATER–14 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 surface water monitoring, revegetation and restoration of disturbed areas, post-decommissioning maintenance, collection and disposal of project materials and chemicals, and access restrictions.

Verification: At least sixty (60) days prior to the start of site mobilization or alternate date as agreed to with BLM, the Project owner shall submit decommissioning plans to the CPM for review and approval. The Project owner shall amend these documents as necessary, with approval from the CPM, should the decommissioning scenario change in the future.

MITIGATION OF COLORADO RIVER IMPACTS

SOIL&WATER–15 The Project owner shall undertake one or more of the activities identified below to mitigate project impacts to flows in the Colorado River. These activities shall result in replacement of 50,590 acre feet or (~1,605 acre-feet annually) for a wet cooled Project or 8,500 acre feet or (~202 acre-feet annually) for a dry cooling Project alternative in the Colorado River Basin over the life of the project.

The Project owner must first consider the use of dry cooling for project operation, and mitigate any remaining project impacts on the Colorado River.

If dry-cooling is not used for project operation then the Project shall install a Zero Liquid Discharge system as the first conservation measure in its Water Supply Plan. Additional measures of water conservation projects should be considered in the following order of priority: Zero Liquid Discharge systems, increase cycles of concentration in the evaporative cooling process, hybrid cooling, payment for irrigation improvements in Palo Verde Irrigation District, purchase of water allotments within the Colorado River Basin that will be held

in reserve, use of tertiary treated water, implementation of water conservation programs in the CVGB, PVMGB or Colorado River flood plain communities, and/or participation in BLM's Tamarisk Removal Program. If the Project owner has filed an application to the Colorado River Board or the Bureau of Reclamation to obtain an allocation of water from the Colorado River, these allocations can be used to satisfy some or all of the water offsets needed to comply with this condition on an acre foot per acre foot basis. Use of any other options will require the Project owner to demonstrate to the satisfaction of the CPM that the appropriate amounts of water will be conserved.

The activities proposed for mitigation will be outlined in a Water Supply Plan that will be provided to the CPM for review and approval. The Water Supply Plan shall include the following at a minimum:

A. Identification of the activity and water source that will replace 50,590 acre feet (~1,605 acre-feet annually) under a wet cooled Project alternative or 8,500 acre feet (~202 acre-feet annually) for a dry cooled Project alternative diverted from the Colorado River over the life of the project;

B. Demonstration of the Project owner's legal entitlement to the water or ability to conduct the activity;

C. Include a discussion of any needed governmental approval of the identified activities, including a discussion of whether that approval that requires ;

D. Discuss whether any governmental approval of the identified activities will be needed, and, if so, whether additional that approval will require compliance with CEQA or NEPA;

E. Demonstration of how water diverted from the Colorado River will be replaced for each of the activities;

F. An estimated schedule for completion of the activities;

G. Performance measures that would be used to evaluate the amount of water replaced by the activities;

H. Monitoring and Reporting Plan outlining the steps necessary and proposed frequency of reporting to show the activities are achieving the intended benefits and replacing Colorado River diversions; and

I. If the application for allocation from the Colorado River is accepted by the USBR, the Project owner shall submit to the CPM for their approval, a copy of a water allocation from the Colorado River issued by the appropriate agency for the Projects diversion of Colorado River water.

The Project owner shall implement the activities reviewed and approved in the Water Supply Plan in accordance with the agreed upon schedule in the Water Supply Plan. If agreement on identification or implementation of

mitigation activities cannot be achieved the Project owner shall immediately halt construction or operation until assurance that the agreed upon activities can be identified and implemented.

The Project owner can choose to refine the estimate of the quantity of water attributed to flow from the Colorado River by implementing **SOIL&WATER-19**. If a lesser volume of water is determined to be diverted from the Colorado River as a result of project pumping pursuant to **SOIL&WATER-19**, that lesser volume shall be replaced in accordance with this Condition.

Verification: The Project Owner shall submit a Water Supply Plan to the CPM for review and approval thirty (30) days before the start of extraction of groundwater for construction or operation.

GROUNDWATER PRODUCTION REPORTING

SOIL&WATER–16 The Project will file an annual notice per the requirement of Water Code Sections 4999 et. seq. for reporting of groundwater production in excess of 25 acre feet per year.

Verification: The Project owner shall file an annual "Notice of Extraction and Diversion of Water" with the SWRCB in accordance with Water Code Sections 4999 et. seq. The Project owner shall include a copy of the filling in the annual compliance report.

GROUND SUBSIDENCE MONITORING AND ACTION PLAN

SOIL&WATER–17 One monument monitoring station per production well or a minimum of three stations shall be constructed to measure potential inelastic subsidence that may alter surface characteristics of the Chuckwalla Valley near the proposed production wells. The Project owner shall:

A. Prepare and submit a Subsidence Monitoring Plan (SMP), including all calculations and assumptions. The plan shall include the following elements:

   1. Construction diagrams of the proposed monument monitoring station including size and description, planned depth, measuring points, and protection measures;

   2. Map depicting locations (minimum of three) of the planned monument monitoring stations;

   3. Monitoring program that includes monitoring frequency, thresholds of significance, reporting format.

B. Prepare quarterly reports commencing three (3) months following commencement of groundwater production during construction and operations.

   1. The reports will include presentation and interpretation of the data collected including comparison to the thresholds developed in Item C.

C. Prepare a Mitigation Action Plan that will detail the following:

1. Thresholds of significance for implementation of proposed action plan;

a. Any subsidence that may occur will not be allowed to damage existing structures either on or off the site or alter the appearance or use of the structure;

b. Any subsidence that may occur will not be allowed to alter the natural drainage patterns or permit the formation of playas or lakes to form;

c. Any subsidence that violates (a) or (b) will result in the Project owner to investigate the need to immediately reduce/cease pumping until the cause is interpreted subsidence caused by project pumping abates and the structures and/or drainage patterns are stabilized and corrected.

2. Action Plan that details proposed actions by the applicant in the event thresholds are achieved during the monitoring program

The applicant will be required to submit the Ground Subsidence Monitoring and Action Plan that is prepared by an Engineering Geologist registered in the State of California thirty (30) days prior to the start of extraction of groundwater for construction or operation.

Verification: The Project owner shall do all of the following:

1. At least thirty (30) days prior to Project construction, the Project owner shall submit to the CPM, a comprehensive report presenting all the data and information required in item A above.

2. During Project construction and operations, the Project owner shall submit to the CPM quarterly reports presenting all the data and information required in item B above.

3. The Project owner shall submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

4. After the first five (5) years of the monitoring period, the Project owner shall submit a 5-year monitoring report to the CPM that submits all monitoring data collected and provides a summary of the findings. The CPM will determine if the Ground Subsidence Monitoring and Action Plan frequencies should be revised or eliminated.

WATER POLICY COMPLIANCE

SOIL&WATER-18 If the Project owner uses wet cooling as part of the overall project, the Project owner shall undertake one or more of the activities identified below to ensure Water Policy Compliance. These activities shall result in replacement of 50,590 acre feet (~1,605 acre-feet annually) in the Chuckwalla Valley Groundwater Basin or the Palo Verde Mesa Groundwater Basin, unless the Project owner mitigates its impacts to the Colorado River through Colorado River water allotments per **SOIL & WATER 15**.

If the Project owner refines the estimate of Colorado River impacts per **SOIL & WATER 19**, or uses Zero Liquid Discharge technology, but still chooses to wet cool, the remaining groundwater use shall be offset in accordance with this condition. If the Project owner chooses to dry cool, reducing water use to 202 afy during operations, this condition does not apply and staff recommends that this project be determined to have met with the Energy Commission's water policy.

The activities proposed for mitigation will be outlined in a Water Policy Compliance Water Supply Plan that will be provided to the CPM for review and approval. The Water Policy Compliance Water Supply Plan shall include the following at a minimum:

A. Identification of the activity and water source that will replace 50,590 acre feet or 1,605 afy under a wet cooling Project alternative;

B. Demonstration of the Project owner's legal entitlement to the water or ability to conduct the activity;

C. Include a discussion of any needed governmental approval of the identified activities, including a discussion of whether that approval that requires ;

D. Discuss whether any governmental approval of the identified activities will be needed, and, if so, whether additional that approval will require compliance with CEQA or NEPA;

E. An estimated schedule for completion of the activities;

F. Performance measures that would be used to evaluate the amount of water replaced by the activities;

G. Monitoring and Reporting Plan outlining the steps necessary and proposed frequency of reporting to show the activities are achieving the intended benefits and replacing the water; and

H. If the application for allocation from the Colorado River is accepted by the USBR, the Project owner shall submit to the CPM for their approval, a copy of a water allocation from the Colorado River issued by the CRB for the Projects diversion of Colorado River water.

The Project owner shall implement the activities reviewed and approved in the Water Policy Compliance Water Supply Plan in accordance with the agreed upon schedule in the Water Policy Compliance Water Supply Plan. If agreement on identification or implementation of mitigation activities cannot be achieved the Project owner shall immediately halt construction or operation until assurance that the agreed upon activities can be identified and implemented.

Verification: The Project owner shall submit a Water Policy Compliance Water Supply Plan to the CPM for review and approval thirty (30) days before the start of extraction of groundwater for construction or operation.

ESTIMATION OF COLORADO RIVER IMPACTS

SOIL&WATER-19 The Project owner may choose to refine the estimates of the amount of subsurface water flowing from the Colorado River due to project pumping used for determining the appropriate volume of water for mitigation in accordance with **SOIL&WATER-15**. If the Project is wet cooled and modeling results show a decrease in impacts to the Colorado River, the project must still mitigate all of its cooling water use as outlined in **SOIL&WATER-15**.

If the Project owner decides to refine these estimates, it shall conduct an analysis of the Project's effect on the PVGB groundwater budget including an estimate of the decrease in underflow form the CVGB to the PVMGB and the decrease that may result in Colorado River water. The analysis shall include the following:

A. Refinement of the estimate of decrease in underflow from the CVGB to the PVMGB using the numerical groundwater flow model developed for the Project. An upper-bound estimate of the underflow decrease shall be developed through sensitivity analysis of the lateral hydraulic conductivity of the pumped aquifer and the general head boundaries.

   1. A statistical analysis of the seventeen existing aquifer tests and specific capacity tests in the eastern CVGB shall be conducted to characterize the distribution of hydraulic conductivity values in the area.

   2. Model runs shall be conducted using the first quartile (25 percent), second quartile (50 percent) and third quartile (75 percent) hydraulic conductivities to evaluate the change in underflow induced by Project pumping under a reasonable range of values.

B. The maximum predicted decrease in underflow shall be used as an input into the USGS Aquifer Depletion Model at the CVGB-PVMGB basin boundary to assess the percentage of decreased underflow that may be considered to be Colorado River water depletion. The USGS model may be adjusted to reflect actual Project conditions.

C. An assessment report shall be prepared summarizing the methods and results of this supplemental analysis, presenting any supporting data, assumptions made, and an estimate of the uncertainty of Colorado River depletion.

D. The Project owner shall present the results of the conceptual model, numerical model, transient runs and sensitivity analysis in a report for review and approval by the CPM. The report shall include all pertinent information regarding the development of the numerical models. The report shall include:

   1. Introduction

   2. Previous Investigations

   3. Conceptual Model

   4. Numerical Model and Input Parameters

   5. Sensitivity Analysis

6. Transient Modeling Runs

7. Conclusions

Verification: Within thirty (30) days prior to mobilization of the proposed Project, the Project owner will submit to the CPM for their approval a report detailing the results of the modeling effort. The report will include the estimated amount of subsurface water flowing from the Colorado River due to project pumping. This estimate shall be used for determining the appropriate volume of water for mitigation in accordance with **SOIL&WATER-15**.

GROUNDWATER QUALITY MONITORING AND REPORTING PLAN

SOIL&WATER-20 The Project owner shall submit a Groundwater Quality Monitoring and Reporting Plan to the CPM for review and approval. The Groundwater Quality Monitoring and Reporting Plan shall provide a description of the methodology for monitoring background and site groundwater levels and quality. The sampling required for the water quality monitoring program shall be implemented during groundwater level monitoring events using the well identified to comply with **SOIL&WATER-5**. Prior to project construction, monitoring shall commence to establish pre-construction groundwater quality conditions in the well proposed for the program and shall include pre-construction, construction, and project operation water use. The primary objectives for the water quality monitoring program are to identify potential changes in the existing water quality of the proposed water supply resulting from Project pumping, if any, in concert with Condition of Certification **SOIL&WATER–5,** establish pre-construction and project related groundwater quality that can be quantitatively compared against observed from the project pumping well and near potentially impacted existing wells, and to avoid, minimize, or mitigate significant impacts to sensitive receptors (springs and groundwater-dependent vegetation, and groundwater supply users).

A. 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). Additional monitoring wells to be installed include wells required under Waste Discharge Requirements issued by the CRBRWQCB for the evaporation ponds and land treatment unit proposed for the project. 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.

B. At least four (4) weeks prior to construction, a Well Monitoring Installation and Groundwater Quality Network Report shall be submitted to the CPM for review and approval in conjunction with Condition of Certification **SOIL&WATER-5**. 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.

C. As part of the monitoring well network development, all newly constructed monitoring wells shall be constructed consistent with State and Riverside County specifications.

D. At least four (4) weeks prior to use of any groundwater for construction, all groundwater quality and groundwater level monitoring data shall be reported to the CPM. The report shall include the following:

   1. An assessment of pre-project groundwater levels, 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 relative to the assumptions and spatial trends simulated by the applicant's groundwater model.

   2. As assessment of pre-project groundwater quality with groundwater samples analyzed for TDS, chloride, nitrates, major cations and anions, oxygen-18 and deuterium isotopes, and any other constituents the CPM deem critical in protecting existing water supply quality.

   3. The data shall be tabulated, summarized, and submitted to the CPM. The data summary shall include the estimated range (minimum and maximum values), average, and median for each constituent analyzed. If a sufficient number of data points are available, the data shall also be analyzed using the Mann-Kendall test for trend at 90 percent confidence to assess whether pre-project water quality trends, if any, are statistically significant.

E. During project construction and during the first five years of project operations, the Project owner shall semi-annually monitor the quality of groundwater and changes in groundwater elevation and submit data semi-annually to the CPM. After five years of project operations, the frequency and scope of the monitoring program shall be reassessed by the CPM. The summary report shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up water level trends as itemized below. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall) from the nearest meteorological monitoring station, and a comparison and assessment of water level data relative to the assumptions and simulated spatial trends predicted by the applicant's groundwater model.

   1. Groundwater samples from all wells in the monitoring well network shall be analyzed and reported semi-annually for TDS, chloride, nitrates, cations and anions, oxygen-18 and deuterium isotopes. These analyses, and particularly the stable isotope data, can be useful for

identifying water sources and assessing their contributions to the quality of water produced by wells.

2. For analysis purposes, pre-project water quality shall be defined by samples collected prior to project construction as specified above, and compliance data shall be defined by samples collected after the construction start date. The compliance data shall be analyzed for both trends and for contrast with the pre-project data.

3. Trends shall be analyzed using the Mann-Kendall test for trend at the 90 percent confidence. Trends in the compliance data shall be compared and contrasted to pre-project trends, if any.

4. The contrast between pre-project and compliance mean or median concentrations shall be compared using an Analysis of Variance (ANOVA) or other appropriate statistical method approved by the RWQCB for evaluation of water quality impacts. A parametric ANOVA (for example, an F-test) can be conducted on the two data sets if the residuals between observed and expected values are normally distributed and have equal variance, or the data can be transformed to an approximately normal distribution. If the data cannot be represented by a normal distribution, then a nonparametric ANOVA shall be conducted (for example, the Kruskal-Wallis test). If a statistically significant difference is identified at 90 percent confidence between the two data sets, the monitoring data are inconsistent with random differences between the pre-project and baseline data indicating a significant water quality impact from project pumping may be occurring.

5. If compliance data indicate that the water supply quality has deteriorated (exceeds pre-project constituent concentrations in TDS, sodium, chloride, or other constituents identified as part of the monitoring plan and applicable Water Quality Objectives are exceeded for the applicable beneficial uses of the water supply) for three consecutive years, the Project owner shall provide treatment or a new water supply to either meet or exceed pre-project water quality conditions to any impacted water supply wells.

Verification: The Project owner shall complete the following:

At least six (6) weeks prior to the start of construction activities, a Groundwater Level and Quality Monitoring and Reporting Plan shall be submitted to the CPM for review and approval before completion of Condition of Certification **SOIL&WATER-2**.

C.9.14 Conclusions

Staff's conclusions based on analysis of the information submitted are as follows:

1. The proposed Project would be located on an alluvial fan where flash flooding and mass erosion could impact the Project. Project-related changes to the alluvial fan hydrology could result in impacts to adjacent land users. A Draft Drainage, Erosion, and Sedimentation Control Plan (DESCP) has been developed to mitigate the

potential storm water and sediment project-related impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. Based on these factors, the proposed Project could result in impacts that would be significant with respect to CEQA significance criteria specified herein and the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA (CEQ NEPA Regulations) significance criteria specified in 40 CFR 1508.27. Therefore, conditions of certification have been developed that define the requirements for reports, plans, monitoring, and inspection, as well as standards and procedures for implementing Best Management Practices (BMPs) during construction and operations. These conditions of certification are included in **SOIL&WATER 1, -8** through **-11,** and **-13**.

2. The proposed Project would be located in an area with no designated entity responsible for maintaining integrity of the rerouted channels. Staff believes the applicant should be required to establish a Channel Maintenance Program as required by Condition of Certification **SOIL&WATER-13**.

3. The proposed Project would have an impact on levels of groundwater in the Chuckwalla Valley Groundwater Basin (CVGB). However, the calculations and assumptions used to evaluate potential groundwater level impacts are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. To ensure that the Project's proposed use of groundwater does not significantly impact the groundwater levels in the CVGB, staff believes the Project applicant should be required to develop a monitoring program and identify what changes are occurring in basin water levels. Substantial changes to groundwater levels caused by the proposed Project and other pumping in the basin would be documented by this monitoring, and a mitigation and reporting program would be required in accordance with Conditions of Certification **SOIL&WATER-2**, **-3**, **-4,** and **-5**.These measures, along with mitigation identified in the Biological Resources section of this Staff Assessment that will be required for significant impacts to groundwater-dependent vegetation that may occur, will be sufficient to ensure that significant impacts related to changes in groundwater levels do not occur.

   The cumulative impact analysis indicates that groundwater extraction during construction and operation of this and other foreseeable projects would place the basin into an overdraft condition. This impact may be exacerbated by other unidentified renewable energy projects in the I-10 corridor, which has been targeted as a potential area for further renewable energy development. However, the amount of water in storage in the basin greatly exceeds the amount of cumulative overdraft, even taking into account the potential for dramatically increased water demand, rendering the project's contribution to this cumulative impact less than cumulatively considerable.

   Finally, the cumulative effects may indirectly impact the adjacent Palo Verde Mesa Groundwater Basin by inducing underflow from the Colorado River. To mitigate the potential project's contribution to impacts to the Colorado River, staff recommends

adoption of **SOIL&WATER-15**, which would require of the applicant to acquire reentitlements or offsets to Lower Colorado River water**.** Staff has also proposed Condition of Certification **SOIL&WATER-19**, which allows the applicant to refine estimates of the amount of induced Colorado River underflow through computer modeling analysis and adjust the required acquisition of entitlements or offsets to Lower Colorado River water accordingly.

4. The applicant for the Project proposes to use groundwater for wet cooling when other feasible technologies are available. Staff believes the proposed use of groundwater for wet cooling would not comply with the state's water policies. To address this inconsistency with state water policy, staff recommends implementation of Condition of Certification **SOIL&WATER-18**, which would require the Project owner to reduce the proposed water use through a project design change(s) and/or through a water conservation program.

5. The Project will generate wastewater that will include: reverse osmosis (RO) reject water, cooling blowdown water and sanitary wastewater. The Project proposes to use evaporation ponds to treat the RO reject water and blowdown water; and a sanitary leachfield to treat the sanitary wastewater. Proposed Conditions of Certification **SOIL&WATER-6** and **SOIL&WATER-7** will ensure that the operation of the wastewater treatments systems are in accordance with regulatory requirements and minimize potential impacts to surface and groundwater quality. In addition, proposed Condition of Certification **SOIL&WATER-20** will monitor existing groundwater quality to monitor compliance with the requirements set forth in **SOIL&WATER-6** and **SOIL&WATER-7.**

6. The Project will generate heat transfer fluid (HTF) contaminated soil as results of accidental spills of HTF fluid. The Project proposes to use a Land Treatment Unit (LTU) to treat contaminated soils. Compliance with proposed Condition of Certification **SOIL&WATER-6** will ensure that the operation of the LTU is in accordance with regulatory requirements and will minimize potential impacts to surface and groundwater quality. In addition, proposed Condition of Certification **SOIL&WATER-20** will require the applicant to monitor existing groundwater quality to monitor compliance with the requirements set forth in **SOIL&WATER-6**.

7. The applicant for the Project proposes to use evaporation ponds as the preferred method of wastewater disposal. Notwithstanding the fact that potential impacts related to the use of evaporation ponds to dispose of the industrial wastewater could be mitigated through effective application of state and local LORS, this method of wastewater disposal is not consistent with the Energy Commission's policy that encourages the use of zero liquid discharge (ZLD) systems that are designed to eliminate wastewater discharge and inherently conserve water. Therefore, staff finds that this method of wastewater disposal does not comply with the state's water policies. As discussed above, to, address this inconsistency with state water policy, staff recommends implementation of Condition of Certification **SOIL&WATER-18**.

8. The applicant proposes to operate a non-transient, non-community water system during operation of the Project. The Project owner will be required to submit all requirements, specifications, certifications to permit and operate of a non-transient,

non-community water system as per Condition of Certification **SOIL&WATER-12.** In addition, the applicant will be required to comply with groundwater production reporting requirements following Condition of Certification **SOIL&WATER-16.** Lastly, the applicant will be required to monitor and mitigate potential ground subsidence associated with groundwater production following Condition of Certification **SOIL&WATER-17.**

The state has expressed a strong interest in developing its solar energy resources. However, the construction and operation of solar energy facilities requires the use of water, which state policy also protects. The Energy Commission must balance the state's interest in promoting solar energy development with its interest in conserving and protecting the state's water resources. Several projects currently proposed for the Mojave and Colorado deserts would use water for power plant cooling, which staff believes is contrary to the state’s long term interest in maximizing solar power generation and minimizing adverse environmental impacts. This will be an especially critical issue in the renewable development areas that will be identified in the Desert Renewable Energy Conservation Plan (DRECP).

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C.9.16 GLOSSARY

Drought condition - hydrologic conditions during a defined period when rainfall and runoff are much less than average.

Groundwater Overdraft - the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions (CDWR, 1998).

Perennial Yield - the maximum quantity of water that can be annually withdrawn from a groundwater basin over a long period of time [during which water supply conditions approximate average conditions] without developing an overdraft condition.- CDWR, 1998).

SOIL AND WATER RESOURCES - APPENDIX A

Acronyms Used in the Soil and Water Resources Section

af	acre-feet
AF	Acre-feet
AFC	Application for Certification
afy	acre-feet per year
AFY	Acre-Feet per Year
msl	mean sea level
bgs	Below ground surface
BLM	United States Bureau of Land Management
BMPs	Best management practices
BP	Before Present
CEC	California Energy Commission
CEQ	Council on Environmental Quality, Executive Office of the President
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CIMIS	California Irrigation Management Information System
CRB	Colorado River Board of California
CRBRWQCB	Colorado River Basin Regional Water Control Board
CVGB	Chuckwalla Valley Groundwater Basin
CWA	Clean Water Act
DESCP	Drainage Erosion and Sediment Control Plan
DR	Data Request
DWR	California Department of Water Resources
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
ft	feet
ft/s	feet per second
ft^2	square feet
ft^2/d	square feet per day
gpd	gallon per day
gpm	Gallons per minute
GSEP	Genesis Solar Energy Project
HTF	Heat Transfer Fluid
in	inches
LORS	Laws Ordinances, Regulations and Standards
LTU	Liquid Treatment Unit
mg/L	milligrams per liter
MMF	Multi-media filter
msl	mean sea level

NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NWIS	National Water Information System
OW	Observation Well
PSPP	Palen Solar Power Project
PVID	Palo Verde Irrigation District
RCFCWCD	Riverside County Flood Control and Water Conservation District
RO	Reverse Osmosis
ROW	Right of Way
RPS	Renewable Portfolio Standard
RWQCB	Colorado River Basin Regional Water Control Board
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
t/ac/yr	tons per acre per year
TDS	Total Dissolved Solids
TW	Test Well
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey

SOIL AND WATER
APPENDIX B

Waste Discharge Requirement
Facts for Waste Discharge

SOIL AND WATER RESOURCES – APPENDIX B

FACTS FOR WASTE DISCHARGE—Genesis Solar LLC, Owner/Operator, Genesis Solar Power Project, Riverside County

1. Genesis Solar, LLC, (the Discharger) is proposing to construct, own and operate a concentrated solar power (CSP) electric generating facility and a land treatment unit (LTU) on land owned by the Bureau of Land Management (BLM). The Facility referred to as the Genesis Solar Power Project is located near Ford Dry Lake in Riverside County, California. A site map is included as **Figure 1**, as incorporated here in and made a part of these requirements for waste discharge (Waste Discharge Requirements, or WDRs). The address for Genesis Solar, LLC is 700 Universe Blvd, FED/JB, Juno Beach, FL 33408. The address for the land owner (BLM) is 1201 Bird Center Drive, Palm Springs, CA 92258.

2. These WDRs regulate the Facility's three evaporation ponds and the LTU. The evaporation ponds are designated as Class II Surface Impoundments Waste Management Units (WMU) and must meet the requirements of the California Code of Regulations (CCRs), Title 27, CCR §20200 et seq. The boundaries of the Genesis Solar Power Project are shown on **Figure 2**, as incorporated here in and made a part of these WDRs.

3. The Discharger submitted a Report of Waste Discharge dated August 27, 2009 for the Genesis Solar Power Project.

4. Definition of terms used in these WDRs:

   a. **Facility** – The entire parcel of property where the proposed Genesis Solar Power Project industrial operation or related solar industrial activities are conducted.

   b. **Waste Management Units (WMUs)** – The area of land, or the portions of the Facility where wastes are discharged. The LTU and the evaporation ponds are WMUs.

   c. **Discharger** – The term Discharger means any person who discharges waste that could affect the quality of the waters of the State, and includes any person who owns the land, WMU or who is responsible for the operation of a WMU. Specifically, the terms "discharger" or "dischargers" in these WDRs means Genesis Solar, LLC.

Facility Location

5. The Facility will be located in the Colorado Desert in Chuckwalla Valley between the communities of Blythe, CA (approximately 24 miles east) and Desert Center, CA (approximately 27 miles west). Ford Dry Lake is located

approximately 1 mile south west of the Project. The Facility is located in Township 6S, Range 19E San Bernardino Base and Meridian. The Facility covers approximately 1,800 acres of Federal land managed by the BLM.

Surrounding Land Use

6. Current land uses around the Facility include I-10 to the south, the Palen McCoy Wilderness to the north, the Palen Dry Lake Area of Critical Environmental Concern (ACEC) to the west and open (unrestricted access) lands to the east. Most of the land near the Facility is managed by BLM. However, there are also private holdings in the area.

Facility Description

7. The Discharger is proposing to develop a 250-megawatt (MW) solar thermal power generating project, using concentrated solar trough technology. There will be two independent 125 MW units on site to provide a total net electrical output of 250 MW. Commercial operation is planned to commence July 2014.

8. The process to produce 125 MW of electrical power in each module is as follows:

    a. 650 to 800 acres of solar fields containing Parabolic Mirrors to collect the Sun's energy (field is oversized to ensure 125MW can still be generated when there is less sun);

    b. HTF absorbs the Sun's energy from the mirrors;

    c. HTF creates Steam in the Solar Steam Generator (SSG);

    d. Steam drives the Steam Turbine Generator (STG); then STG produces Electrical Power.

    e. Solar Arrays;

    f. Wet Cooling area;

    g. Power Block (161-230 KV substation);

    h. Evaporation Ponds (24 acres);

    i. Bioremediation LTU (5 acres); and

    j. Stormwater Detention Pond.

9. The solar thermal technology will provide 100 percent of the power generated by the Project; no supplementary energy source (e.g. natural gas to generate electricity at night) is proposed to be used for electric energy production. The

Project will utilize a natural gas fired auxiliary boilers to reduce start up time and for HTF freeze protection. Freeze protection shall maintain HTF at a minimum 100 degrees Fahrenheit [°F]

10. The Discharger proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing will be supplied from on-site groundwater wells, which also will be used to supply water for employee use (e.g., drinking, showers, sinks, and toilets). A package water treatment system will be used to treat the water to meet potable standards. A sanitary septic system and on-site leach field will be used to dispose of sanitary wastewater.

11. Project cooling water blow down from each unit will be piped to lined, on-site evaporation ponds, which are designated as Class II Surface Impoundments. For safety and operational purposes, accumulated precipitated solids will be removed from the base of the evaporation ponds when they reach a depth of 3 feet. It is estimated that 3 feet of solids will accumulate approximately every 7 years when using groundwater containing 5,000 mg/l of total dissolved solids (TDS) as a water supply. Dewatered residues from the ponds will be sent to an appropriate off-site landfill for disposal. No off-site backup cooling water supply is planned at this time; the use of multiple on-site water supply wells and redundancy in the well equipment will provide an inherent backup in the event of outages affecting one of the on-site supply wells.

12. The Project will include a LTU to treat soil contaminated with HTF. The unit will be designed in accordance with Colorado River Basin Regional Water Quality Control Board (Regional Board) requirements.

Climate

13. The Project is located in an arid desert climate; therefore, there are extreme daily temperature changes, low annual precipitation, strong seasonal winds and mostly clear skies. Evaporation rates are higher than precipitation rates. Based on 60 years of data from Blythe Airport, the mean maximum temperatures in June to September exceed 100°F. Winter months are more moderate with mean maximum temperatures of high 60's to low 70's °F and minimum temperatures in the low to mid 40's °F. Although there are no average minimal temperatures below freezing point (32°F), the temperature has historically dropped below freezing point between November and March.

14. Average annual evaporation in the Facility area, based on published data at the Indio Fire Station 70 miles west of the Project site, is 105 inches, of which 87 percent of that evaporation occurs between March and October. Average annual precipitation in the Project area, based on the gauging station at Blythe Airport, is 3.55 inches, with August recording the highest monthly average of 0.63 inches and June recording the lowest monthly average of 0.02 inches. Per the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the

Southern California area, 3.51 inches of rainfall shall fall in the 100 year, 24 hour storm event.

15. Winds in the Project area are generally south to southwest with a less frequent component of northerly winds (north through northwest). Calm conditions occur approximately 16.43% of the time, with the annual average wind speed being approximately 7.62 miles per hour (mph) (3.41 m/s).

Regional Topography and Drainage

16. The general topography in the area of the Facility consists of mountain ranges surrounded by extensive alluvial fans coalesced into bajadas that slope toward the topographic low-points of the valley, Ford Dry Lake and Palen Lake. The Project site is situated within the Chuckwalla Valley and is relatively flat. The Project site generally slopes from north to south with elevations of approximately 400 to 370 feet above mean sea level. There are no perennial streams in Chuckwalla Valley and a vast majority of the time, the area is dry and devoid of any surface flow anywhere. Water runoff occurs only in response to infrequent intense rain storms. Much of the area is subject to inundation either by sheet flow or flow confined to an expansive network of ephemeral washes, Palen and Ford Dry Lakes, and other local topographic low-points. The entire area drains first to these two dry lakes, and then to evaporation or groundwater.

Flood Hazard

17. The Facility is within “RIVERSIDE COUNTY AND INCORPORATED AREAS” as designated by the Federal Emergency Management Agency (FEMA); however, there are no flood insurance maps provided for this area. The Site is not located in a flood hazard area identified in the Riverside County General Plan Safety Element.

Regional Geology

18. The region has undergone a complex geologic history that includes sedimentation, volcanic activity, folding, faulting, uplift and erosion. The Project area is underlain by Holocene to Miocene basin fill deposits (Stone, 2006). These deposits include younger alluvium, older (Pleistocene) alluvium, the Pliocene Bouse Formation and the Miocene fanglomerate. The uppermost alluvium in the basin consists of Holocene to Pleistocene alluvial fan, fluvial, playa, and aeolian (wind blown) deposits. In general, coarser alluvial fan deposits are found near the valley edges and grade into finer distal fan, valley axial (fluvial) and playa deposits near the low points of the basin. Holocene-age playa deposits are found in the Ford Dry Lake area and consist mainly of clay, silt, and sand above the water table (DWR 1963).The older alluvium (Pleistocene age) consists of fine to coarse sand interbedded with gravel, silt, and clay (DWR 1963). The Pleistocene alluvium likely comprises the most important aquifer in the area (DWR 1963). The Pliocene-age Bouse Formation

is a marine to brackish-water sequence that is composed of a basal limestone overlain by interbedded clay, silt, sand, and tufa. Near the southeastern portion of the basin the Bouse Formation occurs at a depth between approximately 100 to 800 feet below ground surface (bgs) (Wilson and Owens-Joyce 1994).The fanglomerate lies unconformably below the Bouse Formation and is composed chiefly of angular to subrounded and poorly sorted partially to fully cemented pebbles with a sandy matrix (Metzger 1973). The fanglomerate is likely Miocene age; however, it may in part be Pliocene age (Metzer 1973). Near the southeastern portion of the basin the fanglomerate occurs at a depth between approximately 800 to 5,000 feet bgs (Wilson and Owens-Joyce 1994).

Site Specific Geology

19. Geologic units near the project area consist of the recent dune sand, recent alluvium, and non-marine sedimentary deposits. The unconsolidated alluvial fan, river channel, and stream deposits consist of silt, sand, clay, and gravel. These also include recent floodplain deposits of the Colorado River including silt, sand, and clay. The nonmarine sedimentary deposits consist of older alluvium and fanglomerate, dissected with well-developed desert pavement and desert varnish in some areas. These consist mostly of clay, siltstone, sand, and gravel.

Seismicity

20. The Project site lies within the eastern part of Riverside County in a part of California considered not to be very seismically active. Although there are several bedrock faults off site in the mountains surrounding Chuckwalla Valley, these do no exhibit recent activity and are presumed to be Tertiary or pre-Tertiary in age (Stone, 2006). In addition, gravity anomalies suggest the presence of several subsurface faults beneath Chuckwalla Valley in the vicinity of the project area (Stone, 2006; Rotstein, et al., 1976). The gravity anomalies reflect abrupt changes in basement elevation strongly suggestive of dip-slip movements. In addition, some of these faults may have undergone right-lateral strike slip movements. These faults are presumed Tertiary and likely inactive with very low chance of earthquakes.

21. The active faults considered most likely to produce large earthquakes potentially affecting the Project site are located at a considerable distance to the west and southwest and include the San Andreas, Imperial, and San Jacinto-Anza faults. Other smaller faults are located within approximately 100 kilometers (km) of the Site. These faults are believed to be capable of producing ground shaking with peak ground accelerations exceeding 0.10 times the force of gravity (0.10 g).

Seismic Shaking

22. A preliminary estimate of ground motions expected at the site was prepared using source and attenuation models developed by the USGS National Seismic

Hazard Mapping Project (NSHMP, 2009). For design of important facility structures, a site-specific Probabilistic Seismic Hazard Assessment is being completed as part of an ongoing Geotechnical Investigation and will be made available to the CEC. The preliminary results indicate that peak ground acceleration (PGA) with a probability of exceedance of 10 percent in 50 years (475 Year Return Period) is 0.14 g. The deaggregation information indicates that the mean moment magnitude is 6.8 at a mean distance of 68 km. The PGA with a probability of exceedance of 2 percent in 50 years (2475 Year Return Period) is 0.23 g. The mean moment magnitude is 6.7 at a mean distance of 48 km.

Ground Rupture

23. The Project site is not located within a State of California Earthquake Fault Zone designated by the Alquist-Priolo Special Studies Zone Act of 1972 (formerly known as a Special Studies Zone), an area where the potential for fault rupture is considered probable (Riverside County, 2008). In addition, no Quaternary, Sufficiently Active, or Well Defined Faults are located under or near the Site. Based on this information and engineering judgment, earthquake-induced ground rupture is not considered to be a significant hazard at the Site.

Slope Stability

24. The Site is not considered to be an area with the potential for permanent ground displacement due to earthquake-induced landslides because surface topography at and near the site is relatively flat (Riverside County, 2008). A review of the Riverside County General Plan, Safety Element, did indicate areas considered susceptible to earthquake induced landslides and rockfalls in the Palen and McCoy Mountains; however, these areas are several miles from the Site and are not expected to impact the Project. Based on this information and engineering judgment, slope instability is not considered to be a significant hazard at the Site.

Erosion

25. Erosion is the displacement of solids (soil, mud, rock, and other particles) by wind, water, or ice and by downward or down-slope movement in response to gravity. Due to generally flat terrain, the Project site is not prone to significant mass wasting (gravity-driven erosion and non-fluvial sediment transport) at present. The Riverside County General Plan, Safety Element (Riverside County, 2008), indicates the Site is in an area with moderate potential for wind erosion, the off-site linears are in areas with moderate to high potential for wind erosion. Soil characteristics at the Project site allow for the potential for wind and water erosion, and significant sediment transport currently occurs across the valley axial drainage that crosses the majority of the proposed plant site. As indicated above, these valley axial deposits are characterized by subdued bar and swale topography and ongoing deposition from sheet floods. Limited sand and aeolian erosion also occurs between depositional episodes.

26. To address the management of sediment transport, erosion and sedimentation during operation, the project design will incorporate diversion berms, channels, detention basins and dispersion structures. The final design for these features will be developed during detailed design, and will include industry-standard calculations and modeling to reduce the potential for erosion or sedimentation, and to reduce the need for ongoing maintenance. Dirt roads and exposed surfaces will be periodically treated with dust palliatives as needed to reduce wind erosion. Construction and maintenance of the proposed drainage and sediment management system at the Site is expected to reduce water and wind erosion at and downstream of the Site to less than significant levels.

Liquefaction

27. Liquefaction is a soil condition in which seismically induced ground motion causes an increase in soil water pressure in saturated, loose, uniformly-graded sands, resulting in loss of soil shear strength. As a result, the effects of liquefaction can include loss of bearing strength, differential settlement, ground oscillations, lateral spreading, and flow failures or slumping. Liquefaction occurs primarily in areas where the groundwater table is within approximately 50 feet of the surface (Riverside County, 2008). The Riverside County General Plan Safety Element (Riverside County, 2008) indicates that the majority of Chuckwalla Valley, including the soils beneath the Project site and associated Project off-site linears, is mapped as having deep groundwater but underlain by soils with an otherwise moderate susceptibility to liquefaction. The depth to water beneath the Site is estimated to range from approximately 61 to 94 feet bgs. In addition, the sandy soils encountered in the upper 100 feet beneath the Project site during geotechnical drilling are generally dense and well graded. Dense, well-graded sands are not generally considered susceptible to liquefaction. Based on this information and engineering judgment, the potential for liquefaction hazard at the Project site is considered to be low. The potential for liquefaction will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

Differential Settlement

28. Seismically induced settlement can occur during moderate and large earthquakes in soft or loose, natural or fill soils that are located above the ground water table, resulting in differential settlement. The settlement can cause damage to surface and near-surface structures. The most susceptible soils are clean loose granular soils. Due to the expected dense to very dense nature of the near surface soils, the potential for damage due to seismically induced settlement is considered to be low at the Project site. The potential for seismically-induced settlement will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

Collapsible Soil Conditions

29. Alluvial soils in arid and semi-arid environments can have characteristics that make them prone to collapse with increase in moisture content and without increase in external loads. Soils that are especially susceptible to collapse or hydrocompaction in a desert environment are loose dry sands and silts, and soils that contain a significant fraction of water soluble salts. In the Site vicinity, this would include aeolian sand, playa evaporite deposits, and potential loose flash flood deposits. Based on surface reconnaissance, review of geologic mapping, and review of aerial photographs, although there are aeolian deposits south of the Site near Ford Dry Lake, but no significant aeolian or playa deposits are located within the Site. There do not appear to be near surface evaporite deposits associated with Ford Dry Lake (Stone, 2006). The near surface soils at the Site are composed primarily of alluvial soils which appear to have been deposited in relatively thin sheet flood and fluvial deposits have a low potential for hydrocompaction. Based on this data and engineering judgment, the site soils do not have a significant potential for hydrocompaction or collapse. The potential for hydrocompaction and soil collapse will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

Expansive Soil

30. Expansive soil is predominantly fine grained and contains clay minerals capable of absorbing water in their crystal structure. It is often found in areas that were historically a flood plain or lake area, but can also be associated with some types of shale, volcanic ash or other deposits, and can occur in hillside areas also. Expansive soil is subject to swelling and shrinkage, varying in proportion to the amount of moisture present in the soil. As water is initially introduced into the soil (by rainfall or watering) expansion takes place. If dried out, the soil will contract, often leaving small fissures or cracks. Excessive drying and wetting of the soil can progressively deteriorate structures that are not designed to resist this effect, and can lead to differential settlement under buildings and other improvements. The surficial soils at the site generally consist of predominantly granular soils that do not contain much clay and are not subject to significant expansion hazards. The potential for expansive soils will be further evaluated as part of the Final Geotechnical Investigation for the Project, and if necessary, design parameters to address identified conditions will be incorporated into the detailed project design.

31. Based on the above information, the cut and fill slope dimensions and earthwork requirements will be adequate to address the stability of the evaporation ponds and LTU for the life of the project and no further analysis is warranted.

Regional Hydrogeology

32. The site is located in the eastern half of the Chuckwalla Valley Groundwater Basin which encompasses approximately 605,000 acres. The basin generally trends east-southeast and is bounded by consolidated rocks of the Chuckwalla, Little Chuckwalla, and Mule Mountains on the south, of the Eagle Mountains on the west, and of the Mule and McCoy Mountains on the east. Groundwater flow is directed southward from the basin's boundary with the Cadiz Valley Basin and east-southeastward from its boundary with the Pinto Valley Basin, toward the eastern basin boundary where it flows into the adjacent Palo Verde Mesa Basin. Beneath the Site, groundwater occurs at depths ranging from approximately 70 to 90 feet bgs (approximately 298 to 315 feet msl).

33. There are three water-bearing sedimentary units overly non-water bearing bedrock in the Chuckwalla Valley Groundwater Basin; Quaternary Alluvium., Pliocene Bouse Formation and Miocene Fanglomerate (DWR, 2004; DWR, 1963). DWR reports the maximum thickness of these deposits as about 1,200 feet in the Chuckwalla Valley Basin (DWR 1979). Gravity studies performed by USGS near the narrows between the McCoy and Mule Mountains on the southeastern portion of the basin suggests the depth to non-water bearing bedrock ranges from approximately 6,500 feet bgs to 1,000 feet bgs (Wilson and Owens-Joyce 1994).

34. Groundwater quality varies markedly in the basin. The best groundwater quality is located in the western portion of the basin near Desert Center and the worst water quality is located in the southeastern portion of the basin near Ford Dry Lake (Steinemann, 1989). Groundwater to the south and west of Palen Lake is typically sodium chloride to sodium sulfate-chloride in character (DWR 2004). The detected concentrations of TDS in the basin range from 274 milligrams per liter (mg/L) to 8,150 mg/L with an average concentration of 2,100 mg/L (Steinemann 1989). Generally, the dissolved-solids concentrations increase moving further downgradient from Desert Center (to the southeast) and are highest in the central and eastern parts of the basin (Steinemann 1989). In general, the groundwater in the basin has concentrations of sulfate, chloride, fluoride, and dissolved solids too high for domestic use and concentrations of sodium, boron and dissolved solids too high for irrigation use (DWR 1975). Several of the wells sampled in the basin contain high levels of fluoride and boron.

Site Specific Hydrogeology

35. Site-specific investigation indicates the water quality in the study area varies laterally and vertically. Generally, water quality improves vertically with depth and laterally to the south. Vertically, water quality is generally the worst in the alluvium followed by the Bouse Formation and finally by the Fanglomerate. Calculated TDS concentrations from borehole geophysical logging indicate TDS concentrations as high as 30,500 mg/L within finer grained units (silt and clay) in the alluvium decreasing to less than 5,000 mg/L TDS in more transmissive

sediments in the Bouse Formation at depths of 800 to 900 feet bgs. Laterally, water quality is generally better south and southeast of the Site within all three water bearing units in the basin. The best water quality in the study area is generally in the vicinity of and south of I-10.

On-site Drainage

36. On-site storm water management for the completed facility will be provided through the use of source control techniques, site design and treatment control. The storm flows from the solar collector arrays will be treated through the use of swales, ditches and detention ponds. Minimum preliminary volumes required for the detention basins are 66 acre-feet for Unit 1, and 49 acre-feet for Unit 2. These volumes are based on the detention ponds receiving the 100 year, 24 hour event post-development runoff from the Project site, and then discharging the run-off at the pre-developed rate into the existing drainage system. The Riverside County Best Management Practice (BMP) Manual requires extended detention basins to release runoff over a 48 hour draw down period, and the outlet sized to retain the first half of the design volume for a minimum of 24 hours.

37. Locations within the power block for the potential of chemical or oil releases will be fully contained. Rainfall within the containment areas will be allowed to evaporate or will be drained through an oil water separator. Locations within the power block where “contact” storm water may occur will be contained within a system of curbs or trenches. Drains from these curbed areas or containment trenches will be directed to an oil water separator. The oil separated and captured within the oil water separator will be trucked off-site to a licensed disposal/recycling facility. Clean water discharged from the oil water separator will be used on Project site by discharging it to the cooling tower or to the raw water storage tank. The water discharge from the oil water separator will not be discharged to the storm water system.

Facility Operational Water

38. Water to supply the project will be derived from a minimum of two new groundwater supply wells located near each unit’s power block area. The wells will pump groundwater from the Bouse Formation below a depth of 780 feet bgs. Two wells at each units power block will provide redundancy in the event of outages or maintenance.

39. The average total annual water usage for each 125 MW unit is estimated to be about 822 acre-feet per year (afpy), or 1644 afpy for the Project, which corresponds to an average daily flow rate of about 1000 gallons per minute (gpm). Usage rates will vary during the year and will be higher in the summer months when the peak maximum flow rate (instantaneous daytime maximum rate) could be as high as about 2,013 gpm for each 125 MW power plant, or 4,026 gpm for The Project. Equipment sizing will be consistent with peak daily rates to ensure adequate design margin.

40. The TDS concentration of the proposed groundwater supply is 5000 mg/L. The groundwater is not considered a potential source for municipal or domestic water supply under Resolution 88-63 of the State Water Resources Control Board as the TDS exceeds 3000 mg/L.

Evaporation Ponds (Design and Installation Sequence)

41. The 8-acre evaporation ponds have a proposed average design depth of 8 feet across each pond which incorporates:

    a. 3 feet of sludge buildup;

    b. 3 feet of operational depth; and

    c. 2 feet of freeboard.

42. The sub grade under the liner system will be scarified, moisture conditioned, compacted, and proof-rolled with a smooth drum roller to form a competent working surface. The subgrade beneath the Geosynthetic Clay Layer (GCL) needs to have an adequate moisture content to ensure effectiveness of the GCL layer. Therefore, additional moisture conditioning will be specified immediately prior to installation of the GCL layer. The purpose of this is to add additional moisture beneath the GCL to provide moisture for hydration of the GCL material.

43. The GCL liner will be installed in accordance with current practices and will employ the use of proper installation requirements, following manufacturer requirements for the GCL and proper QA/QC during installation to ensure proper continuity of the base layer.

44. The secondary liner or lower liner will consist of a 40 mil thick HDPE geomembrane liner. This liner will be installed in accordance with current practices and will employ the use of wedge welding and extrusion welding procedures. In addition, destructive and non-destructive testing procedures will be used to ensure liner quality and continuity.

45. A HDPE geonet drainage layer, with an option for non-woven geotextile heat bonded to one side or both sides, will be used in the leak detection and collection layer between the primary and secondary liners. HDPE geonet used in combination with geotextile materials has been selected because polyethylene is not reactive with the fluids and provides a highly conductive layer, it is readily available, and is easily installed with minimal potential for damage to the liner system during installation.

46. The base of the evaporation pond leak detection and collection layer will slope at a minimum inclination of 1% to a leak collection trench. The trench will contain screened coarse sand (with no fines) and a perforated pipe that will

slope at a minimum inclination of ¾% towards a leak detection and collection sump, located at the lowest point in the pond. The water in the collection sump will drain by gravity to a monitoring well that is constructed for each evaporation pond (one well per pond). Automated pneumatic pumping systems in the monitoring wells will automatically return water collected in the sump to that evaporation pond, which in turn minimizes the hydraulic pressures across the secondary liners and therefore the risk of leakage through the secondary liner. Leakage rates will be measured using a flow totalizer.

47. The collection sump, pipe, and monitoring well, will include prefabricated and field-fabricated HDPE components with water tight, extrusion welded and wedge welded seams and penetrations. The liner system will be installed in accordance with current practices. Destructive and non-destructive testing procedures will be used to verify sump and penetration tightness and continuity.

48. This design is consistent with CCR, Title 27, Section 20340, which requires a Leachate Collection and Removal System (LCRS) between the liners for surface impoundments.

49. The upper or primary liner will consist of a 60 mil thick HDPE geomembrane liner. Consistent with installation of the secondary 40 mil HDPE liner, current installation, quality control monitoring, testing, and quality assurance measures and techniques will be employed to ensure liner quality and continuity. The primary liner will be protected by a non-woven geotextile that will be installed directly on top of the liner.

50. The moisture detection system below the liner system consists of continuous carrier pipes installed at the sides and low point of each pond (one carrier pipe per pond) at a depth of approximately 5 feet below the secondary liner. The carrier pipes will be terminated at the surface on each side of the pond and will be equipped with a pull cable system for conveyance of a neutron probe for moisture detection.

51. Prior to the placement of the hard surfacing, a 1 foot thick sub-base layer consisting of granular fill with a maximum particle size of ½” shall be placed and spread over the non-woven geotextile. The sub-based layer will be spread carefully and sequentially to avoid damage to the underlying liner system. After placement, the granular layer will be proof rolled using light compaction equipment.

52. A hard surface / protective layer will be constructed on the non-woven geotextile that covers the primary liner. The hard surface will allow for vehicular traffic during unscheduled or emergency maintenance or cleanout. Hard surface types to be considered and assessed include roller compacted concrete, or an approved equivalent (formed concrete, gunite, or other alternates, all of which must be submitted for approval).

53. An aggregate road base material will be placed along the top of each berm to provide an all weather access location for maintenance vehicles. The material will conform to the Department of Transportation Specifications for Class II Aggregate Base. This will be installed to a minimum thickness of 6 inches and will be placed and compacted in accordance with the Department of Transportation requirements.

Action Leakage Rate

54. The action leakage rate (ALR) is the allowable leakage from the primary liner system above which contingency actions are triggered. According to CFR 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).

55. The estimated ALR for the evaporation ponds is 2,750 gallons per acre per day. This is based on one standard hole per acre, a drainage layer geonet with hydraulic conductivity of 0.06 m/s and a 50% safety factor. The assumption underlying this ALR calculation will be verified in the actual constructed ponds. Based on an 8 acre pond, each evaporation pond would have an ALR of 2,200 gallons per day. However, the ALR will need to have field verification as this rate will vary depending on actual drainage material used and its hydraulic conductivity. A final ALR will be submitted to the Regional Board within six months of the effective date of these WDRs based on field analysis.

56. A large hole in the geomembrane may cause a rapid large leakage rate (RLLR) of approximately 9,500 gallons per acre per day. This would equate to a RLLR of 76,000 gallons per day per pond. The RLLR is provided herein for informational purposes only.

57. The recording flow totalizer at each sump will be monitored at least weekly to determine the leakage rate through the primary liner. If the leakage rate exceeds the ALR, then the appropriate actions in the Contingency Plan will be implemented.

Waste Classification

58. Wastewater from several processes within each 125MW Unit will be piped to three 8-acre evaporation ponds (total combined pond top area of 24 acres) for disposal. Therefore there is a total of 48 acres (top pond area) of evaporation ponds on the Project site. Discharge into the evaporation ponds is derived from three primary and one occasional source:

    a. Pre-cooling tower water treatment multi media filter (MMF) waste stream;

    b. Post-cooling tower water treatment MMF waste stream;

c. Post-cooling tower water treatment 2nd Stage revises osmosis (RO) waste stream; and

d. Occasionally, stormwater accumulated in the proposed LTU that will be used to treat soil affected by spills of HTF.

59. Raw water and pre-treated water are used to supply various plant needs, including cooling tower circulating water, solar steam generator makeup water, and various plant service needs. All these water streams eventually discharge into the evaporation ponds.

Wastewater Discharge

60. The combined estimated rate of wastewater discharge into the evaporation ponds is 214 gpm for peak conditions and 182 gpm under annual average conditions. The peak flow rates occur in the summer months, between May and August, when solar energy production is at a peak.

61. The modeled water chemistry of the blowdown from the cooling tower after 15 COC indicates that chloride, sodium and sulfate will be the primary species, along with smaller concentrations of scale forming species (i.e., calcium, magnesium and silica) that were not removed during pre-treatment. Therefore post-treatment is needed to recover most of the wastewater for reuse to minimize the quantity of makeup water required, and to minimize the size of the waste management units (evaporation ponds). Post-treatment will consist of an MMF and Reverse Osmosis (RO) unit, where similar to the pre-treatment process, the MMF will remove solids from the cooling tower blowdown that may damage or reduce the efficiency of the RO membranes. Treated water through the RO units will be returned to the cooling tower for recycling, and the waste stream from the MMF and second RO unit will be discharged into onsite evaporation ponds.

62. The estimated rate of wastewater discharge into the evaporation ponds from the post-treatment MMF unit is 13 gpm for peak conditions and 11 gpm under annual average conditions. Similar to the pre-treatment MMF system, this discharge will occur only when the MMF system is backwashed to remove the build up of residue.

63. The estimated rate of wastewater discharge into the evaporation ponds from the post-treatment RO unit is 161 gpm for peak conditions and 137 gpm under annual average conditions.

Evaporation Residue

64. During the 30-year operating life of the Facility, it is estimated that up to 13 ft of sludge may accumulate in the bottoms of the evaporation ponds that consists of

precipitated solids from the evaporated wastewater. For operational and safety purposes, the ponds will be cleaned when 3 feet of precipitated solids are accumulated in the base of the ponds, which is estimated to be every 7 years when using groundwater with a TDS of 5,000 mg/L. Approximately 7,150 tons of evaporative residues will be accumulated yearly, which equates to approximately 50,000 tons of evaporative residue being removed during each cleanout. The total amount of accumulated sludge is estimated to be approximately 215,000 tons over 30 years.

65. The predicted concentrations of chemical constituents in the evaporation residue in the ponds are less than the Total Threshold Limit Concentrations (TTLCs) for all reported parameters. The predicted concentrations of chemical constituents in the evaporation residue in the ponds is also less than 10 times the Soluble Threshold Limit Concentrations (STLCs) for reported parameters; therefore, further analysis of the residue using the Waste Extraction Test (WET) would not be required and the waste may be classified as non-hazardous under CCR Title 22, Division 4.5. In addition, the total concentrations of chemical constituents in the evaporation residue in the ponds is less than the Toxicity Characteristic Leaching Procedure (TCLP) for all reported parameters; therefore, further analysis of the residue using the TCLP method would not be required and the waste may be considered a non-hazardous waste under federal regulations. Testing of this material will be conducted as part of the facility monitoring program to verify this characterization. The evaporation residue accumulated in the ponds is non hazardous; however, it does contain pollutants which could exceed water quality objectives if released, or that could be expected to affect the beneficial uses of waters of the state. Therefore, the evaporation residue is classified as a “designated waste.” This classification is consistent with CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20210.

Land Treatment Unit

66. The proposed design for the LTU has been selected to optimize performance based on the operating requirements. The location of the LTU is shown in Attachment B, as incorporated here in and made a part of these WDRs. The LTU will not incorporate a liner containment system or LCRS, but will be constructed with a prepared base consisting of 2 feet of compacted, low permeability, lime-treated material. This base will serve as a competent platform for land farming activities, and will serve to slow the rate of surface water infiltration in the treatment area. The compacted and native soil beneath the LTU is designated as a “treatment zone” to a depth of 5 feet. Although the LTU will be taking vehicle traffic, no hard surface will be required, as there is no liner system to protect. A staging area is allocated in the LTU for storage of HTF-impacted soils while they are being characterized. Soil characterized as hazardous will be removed from the site; therefore, no additional liner system is required in the LTU to cater for the hazardous waste.

67. The LTU will be surrounded on all sides by a 2-foot high compacted earthen berm with side slopes of approximately 3:1 (horizontal: vertical). These berms will control and prevent potential inflow (run-on) of surface storm water into the LTU or runoff of stormwater from the LTU.

68. The LTU will be used to treat HTF-affected soil at various concentrations. HTF (Therminol VP-1 or equivalent) is an oil that consists of a mixture of biphenyl and diphenyl oxide that is solid at temperatures below 54 degrees Fahrenheit, is relatively insoluble in water (solubility of approximately 25 milligrams per liter), combustible, and has relatively low volatility (Solutia, 2006). The components of HTF are reported to biodegrade relatively rapidly in the environment, have slight toxicity to tested terrestrial species, higher toxicity to tested aquatic species, and a potential to bio-accumulate (IPCS, 1999; JECFA, 2003; SOCMA Biphenyl Working Group, 2003).

69. Spills of HTF will be cleaned up within 48 hours and affected soil will be moved to a staging area in the LTU where it will be placed on plastic sheeting pending receipt of analytical results and characterization of the waste material. Samples of excavated HTF-affected soil will be collected in accordance with the Environmental Protection Agency's (EPA's) current version of the manual – "Test Methods for Evaluating Solid Waste" (SW-846) and the waste material characterized in accordance with State and Federal requirements.

70. If the soil is characterized as a hazardous waste, the impacted soils will be transported from the site by a licensed hazardous waste hauler for disposal at a licensed hazardous waste landfill. No HTF-impacted soils characterized as hazardous waste will be disposed or treated on site. Based on past experience, it is anticipated that soil containing 10,000 milligrams per kilogram (mg/kg) HTF or more will be managed as hazardous waste, and that soil containing less than 10,000 mg/kg HTF will be a non-hazardous waste and managed at the Project site. If the soil is characterized as a non-hazardous waste, it will be spread in the LTU for bioremediation treatment. In general, more highly contaminated soil will be covered with plastic sheeting to prevent contact with stormwater and to control potential odors and emissions, as well as for moisture and temperature retention. Once the soil has been treated to a concentration of less than 100 mg/kg HTF, it will be moved from the LTU to another portion of the site until it is reused at the facility as fill material.

71. Based on available operation data from other sites, it is anticipated that approximately 750 cubic yards (on average) of HTF-affected soil may be treated per year. Larger or smaller quantities could be generated during some years, depending on the frequency and size of leaks and spills.

72. A spill prevention, control and countermeasure (SPCC) plan will be undertaken for this site. The SPCC will include:

a. Secondary containment around the tanks storing HTF, capable of containing the 110% of the storage tank capacity and/or sufficient freeboard to contain precipitation from a 25-year, 24-hour storm event.

b. It is not practicable to provide secondary containment around HTF product piping, therefore will have daily inspections of all infrastructure containing HTF.

c. If leaks are identified, the affected area will be isolated and spills cleaned up within 48 hours.

Heat Transfer Fluid Treatment Process

73. Treatment of HTF-impacted soil in the LTU will involve moisture conditioning and addition of nitrogen and phosphorous nutrients (i.e., fertilizers) as needed to stimulate consumption of HTF by the indigenous bacteria. The HTF-impacted soil will be moisture conditioned and turned periodically as needed to enhance aeration, promote breakdown of HTF by the indigenous bacteria and/or to control dust emissions. Permanent or portable irrigation sprinklers will supply water to the area for dust control and to assist in treatment.

74. Treatment piles may be covered by plastic sheeting as needed to enhance temperature and moisture retention characteristics, and as needed to control storm water contact, odors and dust emissions.

75. Representative soil samples will be collected for every batch of HTF contaminated soil undergoing treatment in the LTU and composited according to methods specified in EPA SW-846. It is expected that treatment times will vary between one to four months, depending on initial concentrations, and the ambient air and soil temperature.

Hazardous Waste

76. There will be a variety of chemicals stored and used during construction and operation of the project. The storage, handling, and use of all chemicals will be conducted in accordance with applicable laws, ordinances, regulations, and standards.

77. Hazardous materials will be stored in proper containers in material yards and designated construction areas. Cleanup materials (spill kits) will also be stored in these areas. Fuel, oil, and hydraulic fluids used in on-site vehicles will be transferred directly from a service truck to construction equipment and will not otherwise be stored on site.

78. Designated, trained service personnel will perform fueling either prior to the start of the workday or at completion of the workday. Service personnel and construction contractors will follow SOPs for filling and servicing construction equipment and vehicles.

79. Any HTF impacted soil classified as hazardous will be removed from the LTU staging area after the initial characterization. The evaporation ponds will not contain hazardous wastewater or sludge as it is illegal to discharge hazardous waste into surface impoundments under the Toxic Pits Cleanup Act of 1984.

Basin Plan

80. The Water Quality Control Plan for the Colorado River Basin Region of California (Basin Plan) was adopted on November 17, 1993, and designates the beneficial uses of ground and surface water in this Region.

81. The beneficial uses of ground water in the Imperial Hydrological Unit are:

    a. Municipal Supply (MUN)
    b. Industrial Supply (IND)

82. The beneficial uses of nearby surface waters are as follows:

    a. Ford Dry Lake:
        i. Wildlife Habitat (WILD)
        ii. Preservation of Rare, Threatened, or Endangered Species (RARE)

    b. Palen Dry Lake
        i. Wildlife Habitat (WILD)
        ii. Preservation of Rare, Threatened, or Endangered Species (RARE)

Monitoring Parameters

83. Based on the chemical characteristics of the projected discharges to the evaporation ponds from wastewater, the following list of monitoring parameters are required. These specific parameters are selected because they provide the best distinction between the wastewater and the groundwater in the Project area that can be used to differentiate a potential release that could change the chemical composition of the groundwater.

    a. Cations: Antimony, Arsenic, Barium, Cadmium, Calcium, Total Chromium, Cobalt, Copper, Lead, Mercury, Nickel, Selenium, Zinc;

    b. Anions: Chloride and Sulfate; and

    c. Other: HTF, Total Dissolved Solids, Specific Conductivity, and pH.

California Environmental Quality Act (CEQA)

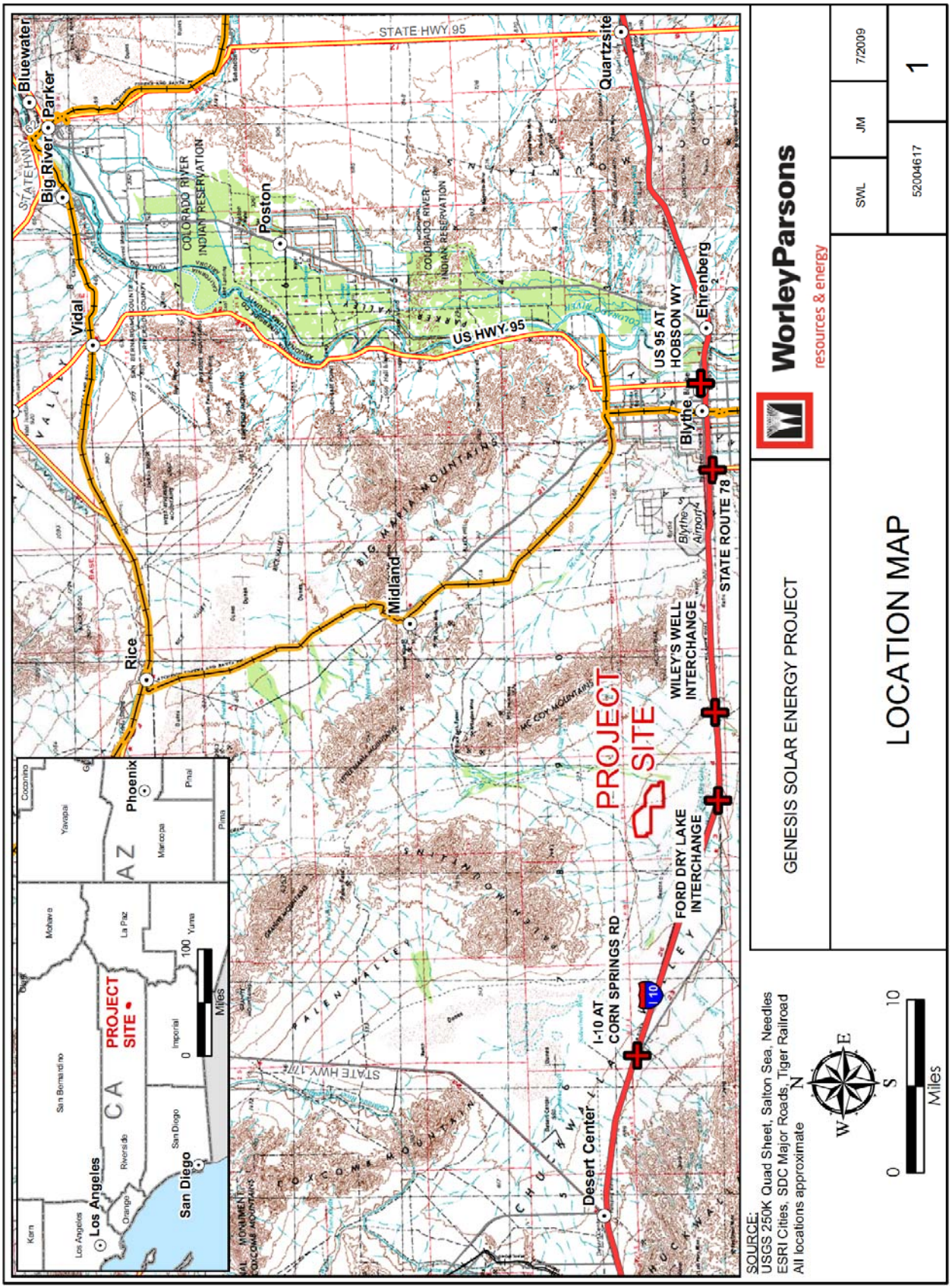
84. The California Energy Commission (CEC) is the lead agency under the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 et seq.) for all thermal power plants with power ratings of 50 MW or

more. The CEC's power plant licensing process is a CEQA-equivalent process. The CEC will coordinate reviews and approvals with the regulatory agencies to ensure that the proposed project meets CEQA requirements. This includes obtaining these WDRs from the staff of the Regional Board. The CEC will certify this project and will include these WDRs as conditions of certification in accordance with the Warren-Alquist Act.[1]

Monitoring and Reporting Program

85. The monitoring and reporting requirements in the Monitoring and Reporting Program (Appendix D), and the requirement to install groundwater monitoring wells, are necessary to determine compliance with these WDRs, and to determine the Facility's impacts, if any, on receiving water.

[1] The Warren-Alquist State Energy Resources Conservation and Development Act is the authorizing legislation for the California Energy Commission. The Act is codified at Public Resources Code (PRC) Section 25000 et seq.. PRC Section 25500 establishes the Commission's authority to certify all sites and related facilities for thermal power plants with power ratings of 50 megawatts or more. The section further declares that "the issuance of a certificate by the commission shall be in lieu of any permit, certificate, or similar document required by any state, local or regional agency, or federal agency to the extent permitted by federal law, for such use of the site and related facilities, and shall supersede any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law."


Bluewater
Parker
Big River
Vidal
Poston
Quartzsite
STATE HWY 95
COLORADO RIVER INDIAN RESERVATION
US HWY 95
US 95 AT HOBSON WY
Ehrenberg
Blythe
Blythe Airport
STATE ROUTE 78
WILEY'S WELL INTERCHANGE
FORD DRY LAKE INTERCHANGE
I-10 AT CORN SPRINGS RD
Desert Center
Midland
Rice
PROJECT SITE
Los Angeles
San Diego
Phoenix
PROJECT SITE
CA
AZ
Miles
GENESIS SOLAR ENERGY PROJECT
LOCATION MAP
WorleyParsons
resources & energy
SWL
JM
7/2009
52004617
1
SOURCE:
USGS 250K Quad Sheet, Salton Sea, Needles
ESRI Cities, SDC Major Roads, Tiger Railroad
All locations approximate
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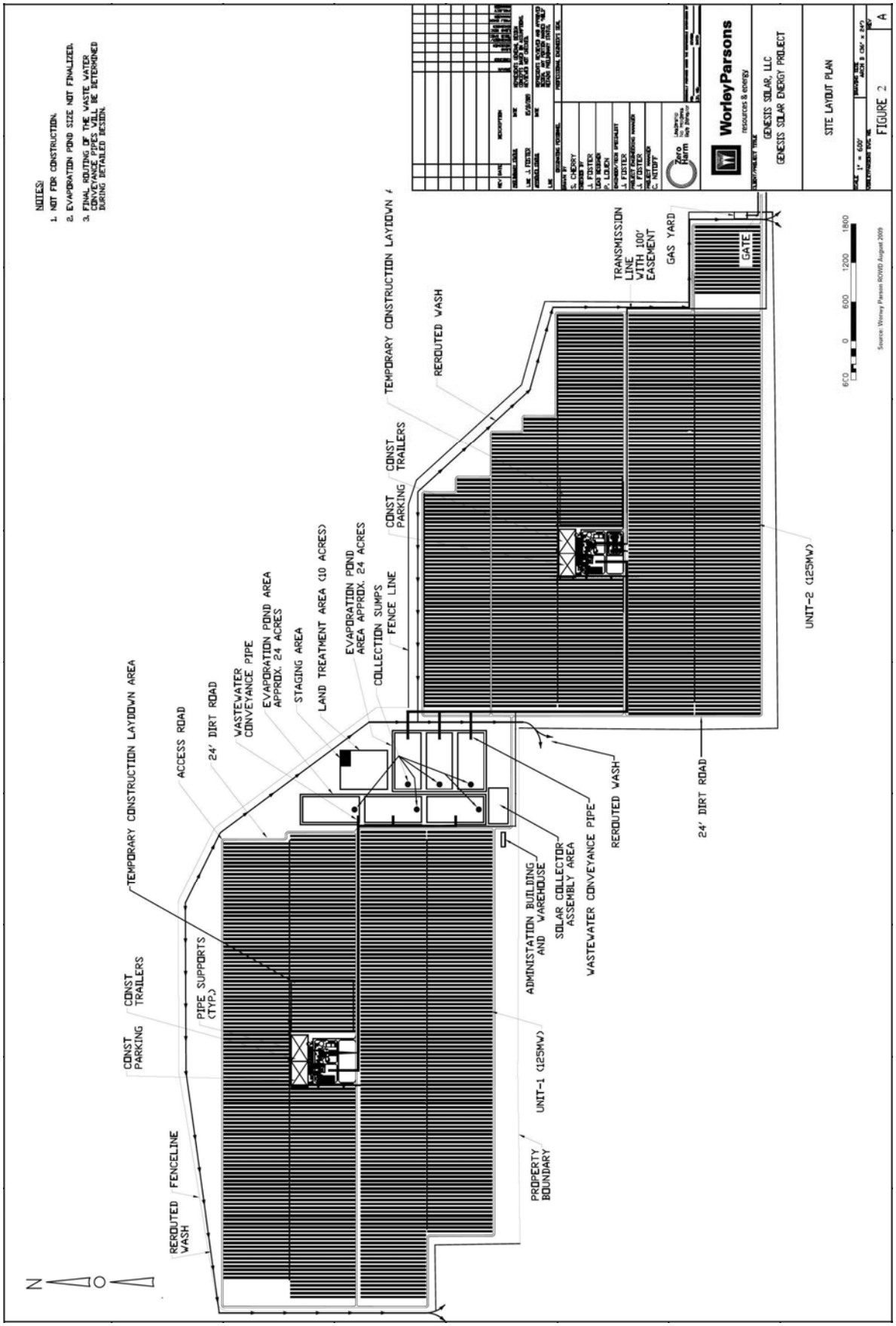
NOTES:
1. NOT FOR CONSTRUCTION.
2. EVAPORATION POND SIZE NOT FINALIZED.
3. FINAL ROUTING OF THE WASTE WATER CONVEYANCE PIPES WILL BE DETERMINED DURING DETAILED DESIGN.
WorleyParsons
RESOURCES & ENERGY
GENESIS SOLAR, LLC
GENESIS SOLAR ENERGY PROJECT
SITE LAYOUT PLAN
FIGURE 2
A
TEMPORARY CONSTRUCTION LAYDOWN AREA
ACCESS ROAD
24' DIRT ROAD
WASTEWATER CONVEYANCE PIPE
EVAPORATION POND AREA APPROX. 24 ACRES
STAGING AREA
LAND TREATMENT AREA (10 ACRES)
EVAPORATION POND AREA APPROX. 24 ACRES
COLLECTION SUMPS
FENCE LINE
CONST PARKING
CONST TRAILERS
TEMPORARY CONSTRUCTION LAYDOWN
REROUTED WASH
TRANSMISSION LINE WITH 100' EASEMENT
GAS YARD
GATE
UNIT-2 (125MW)
REROUTED WASH
24' DIRT ROAD
WASTEWATER CONVEYANCE PIPE
SOLAR COLLECTOR ASSEMBLY AREA
ADMINISTATION BUILDING AND WAREHOUSE
UNIT-1 (125MW)
PROPERTY BOUNDARY
PIPE SUPPORTS (TYP.)
CONST TRAILERS
CONST PARKING
FENCELINE
REROUTED WASH
N
0
600
1200
1800
Source: Worley Parson ROWD August 2009

SOIL AND WATER
APPENDIX C

Waste Discharge Requirement
Requirements for Waste Discharge

SOIL AND WATER RESOURCES – APPENDIX C

REQUIREMENTS FOR WASTE DISCHARGE—Genesis Solar LLC, Owner/Operator, Genesis Solar Energy Project, Riverside County

A. Discharge Specifications

1. The treatment or disposal of wastes at this Facility shall not cause pollution or nuisance as defined in Sections 13050 of Division 7 of the California Water Code (CWC).

2. The Discharger will maintain the monitoring wells in good working order at all times. Well maintenance may include periodic well re-development to remove sediments.

3. Thirty days prior to introduction of a new waste stream into the evaporation ponds, the Discharger must receive approval from the Regional Board's Executive Officer.

4. Waste material shall be confined or discharged to the evaporation ponds.

5. Prior to drilling a new well or abandoning a well at the Facility, the Discharger shall notify, in writing, the Regional Board's Executive Officer of the proposed change.

6. Containment of waste shall be limited to the areas designated for such activities. Any revision or modification of the designated waste containment area, or any proposed change in operation at the Facility that changes the nature and constituents of the waste produced must be submitted in writing to the Regional Board's Executive Officer for review and approval before the proposed change in operations or modification of the designated area is implemented.

7. Any substantial increase or change in the annual average volume of material to be discharged under this order at the Facility must be submitted in writing to the Regional Board's Executive Officer for review and approval.

8. If any portions of the evaporation ponds are to be closed, the Discharger shall notify the Regional Board's Executive Officer at least 180 days prior to beginning any partial or final closure activities.

9. Fluids and/or materials discharged to and/or contained in the evaporation ponds shall not overflow the ponds.

10. Prior to the use of new chemicals for the purposes of adjustment or control of microbes, pH, scale, and corrosion of the cooling tower water and wastewater, the Discharger shall notify the Regional Board's Executive Officer in writing.

11. For the liquids in the evaporation ponds, a minimum freeboard of two (2) feet shall be maintained at all times.

12. Final disposal of residual waste from cleanup of the evaporation ponds shall be accomplished to the satisfaction of the Regional Board's Executive Officer upon abandonment or closure of operations.

13. The evaporation ponds shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods having a predicted frequency of once in 100 years.

14. Prior to removal of solid material that has accumulated in the concrete cooling tower basins, an analysis of the material must be conducted and the material must be disposed of in a manner consistent with that analysis and applicable laws and regulations.

15. Conveyance systems throughout the Facility area shall be cleaned out at least every 90 days to prevent the buildup of solids or when activity at the site creates the potential for release of solid materials from the conveyance systems.

16. Pipe maintenance and de-scaling activities that include hydroblasting and/or sandblasting shall be performed within a designated area that minimizes the potential for release to the environment. Waste generated as a result of these activities shall be disposed of in accordance with applicable laws and regulations. Water from the hydroblasting process shall be conveyed to the evaporation ponds.

17. Public contact with wastewater shall be precluded through such means as fences, signs, or other acceptable alternatives.

18. The evaporations ponds shall be managed and maintained to ensure their effectiveness, in particular,

19. Implementation of erosion control measures shall assure that small coves and irregularities are not created.

20. The liner beneath the evaporation ponds shall be appropriately maintained to ensure its proper functioning.

21. Solid material shall be removed from the evaporation ponds in a manner that minimizes the likelihood of damage to the liner.

22. Ninety days prior to the cessation of discharge operations at the Facility, the Discharger shall submit a workplan, subject to approval of the Regional Board's Executive Officer, for assessing the extent, if any, of contamination of natural geological materials and waters of the Ford Hydrological Unit by the waste. One hundred twenty days following workplan approval, the Discharger shall submit a technical report presenting results of the contamination assessment. A California Registered Civil Engineer or Certified Engineering Geologist must prepare the workplan, contamination assessment, and engineering report.

23. Upon ceasing operation at the Facility, all waste, all natural geologic material contaminated by waste, and all surplus or unprocessed material shall be removed from the site and disposed of in accordance with applicable laws and regulations.

24. The Discharger shall establish an irrevocable bond for closure in an amount acceptable to the Regional Board's Executive Officer or provide other means to ensure financial security for closure if closure is needed at the discharging site. The closure fund shall be established (or evidence of an existing closure fund shall be provided) within six (6) months of the adoption of this Order.

25. Surface drainage from tributary areas or subsurface sources, shall not contact or percolate through the waste discharged at this site.

26. The Discharger shall implement the attached Monitoring and Reporting Program, Appendix D, and revisions thereto, in order to detect, at the earliest opportunity, any unauthorized discharge of waste constituents from the Facility, or any impairment of beneficial uses associated with (caused by) discharges of waste to the brine pond.

27. The Discharger shall use the constituents listed in the attached Monitoring and Reporting Program, Appendix D, and revisions thereto, as "Monitoring Parameters".

28. The Discharger shall follow the Water Quality Protection Standard (WQPS) for detection monitoring established by the Regional Board. The following are parts of WQPS as established by the Regional Board's Executive Officer:

    a. The Discharger shall test for the monitoring parameters and the Constituents of Concern (COCs) listed in the Monitoring and Reporting R7-2010-0xxx and revisions thereto.

    b. Concentration Limits – The concentration limit for each monitoring parameter and constituents of concern for each monitoring point (as stated in the Detection Monitoring Program), shall be its background valued as obtained during that reporting period.

29. All current, revised, and/or proposed monitoring points must be approved by the Region Board's Executive Officer.

30. Water used for the process and site maintenance shall be limited to the amount necessary in the process, for dust control, and for Facility cleanup and maintenance.

31. The Discharger shall not cause or permit the release of pollutants, or waste constituents, in a manner which could cause or contribute to a condition of contamination, nuisance, or pollution to occur.

32. The Discharger must develop and implement a Hazardous Materials Business Plan (HMBP), which will include, at a minimum, procedures for:

    a. Hazardous materials handling, use, and storage;
    b. Emergency response;
    c. Spill control and prevention;
    d. Employee training; and
    e. Reporting and record keeping.

33. Hazardous materials expected to be used during construction include: unleaded gasoline, diesel fuel, oil, lubricants (i.e., motor oil, transmission fluid, and hydraulic fluid), solvents, adhesives, and paint materials. There are no feasible alternatives to these materials for construction or operation of construction vehicles and equipment, or for painting and caulking buildings and equipment.

34. The construction contractor will be responsible for assuring that the use, storage and handling of these materials will comply with applicable federal, state, and local laws, ordinances, regulations and standards (LORS), including licensing, personnel training, accumulation limits, reporting requirements, and recordkeeping.

35. During Facility operations, chemicals will be stored in chemical storage areas appropriately designed for their individual characteristics. Bulk chemicals will be stored outdoors on impervious surfaces in aboveground storage tanks with secondary containment. Secondary containment areas for bulk storage tanks will not have drains. Any chemical spills in these areas will be removed with portable equipment and reused or disposed of properly. Other chemicals will be stored and used in their delivery containers.

36. A portable storage trailer may be on site for storage of maintenance lube oils, chemicals, paints, and other construction materials, as needed. All drains and vent piping for volatile chemicals will be trapped and isolated from other drains to eliminate noxious vapors. The storage, containment, handling, and use of these chemicals will be managed in accordance with applicable laws, ordinances, regulations, and standards.

37. Small quantities of hazardous wastes will be generated over the course of construction. These may include paint, spent solvents, and spent welding materials. Some hazardous wastes will be recycled, including used oils from equipment maintenance, and oil-contaminated materials such as spent oil filters, rags, or other cleanup materials. Used oil must be recycled, and oil or heavy metal contaminated materials (e.g., filters) requiring disposal must be disposed of in a Class I waste disposal facility. Scale from pipe and equipment cleaning operations, and solids from the evaporation pond, will be disposed of in a similar manner.

38. All hazardous wastes generated during facility construction and operation must be handled and disposed of in accordance with applicable laws, ordinances, regulations, and standards. Any hazardous wastes generated during construction must be collected in hazardous waste accumulation containers near the point of generation and moved daily to the contractor's 90-day hazardous waste storage area located on site. The accumulated waste must subsequently be delivered to an authorized waste management facility. Hazardous wastes must be either recycled or managed and disposed of properly in a licensed Class I waste disposal facility authorized to accept the waste.

39. The Discharger shall monitor the evaporation ponds in conformance with applicable CCR Title 27 requirements for Class II surface impoundment waste management units.

40. The leachate collection and removal system must be used to provide preliminary detection monitoring of leaks through the top liner of the double-lined evaporation ponds. Physical evidence of leachate beneath the upper concrete liner shall be interpreted as a warning that containment of the evaporation pond contents may be compromised.

41. Groundwater monitoring wells must be constructed adjacent to and both up gradient and down gradient of the evaporation ponds to provide background and detection monitoring for any potential release from the evaporation ponds containment. The Point of Compliance to be used for the detection monitoring must be the uppermost shallow groundwater beneath the evaporation pond. The groundwater monitoring wells must be constructed in conformance with Title 27 CCR Section 20415 requirements. The monitoring wells must be designed to meet the background and detection monitoring requirements in conformance with Title 27 CCR Section 20415(b)(1)(B) as applicable, including:

    a. Providing a sufficient number of monitoring points to yield ground water samples from the uppermost aquifer that represent the quality of ground water passing the Point of Compliance and to allow for the detection of a release from the evaporation ponds;

b. Providing a sufficient number of monitoring points installed at locations and depths to yield ground water samples from the upper most aquifer to provide the best assurance of the earliest possible detection of a release from the evaporation ponds;

c. Providing a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield ground water samples from zones of perched water to provide the best assurance of the earliest possible detection of a release from the evaporation ponds; and

d. Selecting monitoring point locations and depths that include the zone(s) of highest hydraulic conductivity in the ground water body monitored.

42. The detection monitoring wells shall be constructed to meet the well performance standards set forth in Title 27 CCR Section 20415(b)(4), as applicable, including:

43. All monitoring wells shall be cased and constructed in a manner that maintains the integrity of the monitoring well bore hole and prevents the bore hole from acting as a conduit for contaminant transport.

44. The sampling interval of each monitoring well shall be appropriately screened and fitted with an appropriate filter pack to enable collection of representative ground water samples.

45. For each monitoring well, the annular space (i.e., the space between the bore hole and well casing) above and below the sampling interval shall be appropriately sealed to prevent entry of contaminants from the ground surface, entry of contaminants from the unsaturated zone, cross contamination between portions of the zone of saturation, and contamination of samples.

46. All monitoring wells shall be adequately developed to enable collection of representative ground water samples.

47. The monitoring program must also meet the general requirements set forth in Title 27 CCR Section 20415(e), which require that all monitoring systems be designed and certified by a registered geologist or a registered civil engineer. The applicable general requirements set forth for boring logs, quality assurance/quality control, sampling and analytical methods used, background sampling, data analysis, and other reporting as applicable will be implemented.

48. Baseline samples of the groundwater must be collected from each of the monitoring wells and analyzed prior to discharging wastewater to the evaporation ponds. The groundwater must be initially sampled for each of the proposed monitoring parameters listed in the attached Monitoring and Reporting Program, Appendix D, and any additional Constituents of Concern (COC) identified by the Regional Board.

B. Prohibitions

1. The discharge or deposit of solid waste to the evaporation ponds as a final form of disposal is prohibited, unless authorized by the Regional Board's Executive Officer.

2. The Discharger is prohibited from discharging, treating or composting at this site the following wastes:

    a. Municipal solid waste;

    b. Sludge (including sewage sludge, water treatment sludge, and industrial sludge);

    c. Septage;

    d. Liquid waste, unless specifically allowed by these WDRs or approved by the Regional Board's Executive Officer;

    e. Oily and greasy liquid waste; unless specifically allowed by these WDRs or approved by the Regional Board's Executive Officer;

    f. Hot, burning waste materials or ash.

3. The Discharger shall not cause degradation of any groundwater aquifer or water supply.

4. The discharge of waste to land not owned or controlled by the Discharger is prohibited.

5. Use of wastewater or cooling tower liquids on access roads, well pads, or other developed project locations for dust control is prohibited.

6. The discharge of hazardous or designated wastes to other than a waste management unit authorized to receive such waste is prohibited.

7. Any hazardous waste generated or stored at the facility will be contained and disposed in a manner that complies with federal and state regulations.

8. Wastewater or any fluids in the evaporation ponds shall not enter any canal, drainage, or drains (including subsurface drainage systems) which could provide flow to the Waters of the State.

9. The Discharger shall appropriately dispose of any materials, including fluids and sediments removed from the evaporation ponds.

10. The Discharger shall neither cause nor contribute to the contamination or pollution of ground water via the release of waste constituents in either liquid or gaseous phase.

11. Direct or indirect discharge of any waste to any surface water or surface drainage courses is prohibited.

12. The Discharger shall not cause the concentration of any Constituent of Concern or Monitoring Parameter to exceed its respective background value in any monitored medium at any Monitoring Point assigned for Detection Monitoring pursuant to the attached Monitoring and Reporting, Appendix D, and future revisions thereto.

C. Provisions

1. The Discharger shall comply with the attached Monitoring and Reporting Program, Appendix D, and future revisions thereto, as specified by the Regional Board's Executive Officer.

2. Unless otherwise approved by Regional Board's Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the California Department of Public Health. All analyses shall be conducted in accordance with the latest edition of "Guideline Establishing Test Procedures for Analysis of Pollutants", promulgated by the United States Environmental Protection Agency.

3. The laboratory shall use detection limits less than or equal to Environmental Protection Agency (EPA) Action Level/Maximum Contaminate Levels (MCLs) or California Department of Public Health (CDPH) Notification Level/MCL for all samples analyzed. The lowest concentration, whether EPA or CDPH, of the two agencies must be used for the analysis.

4. Prior to any change in ownership of this operation, the Discharger shall transmit a copy of the Board Order to the succeeding owner/operator, and forward a copy of the transmittal letter to the Regional Board.

5. Prior to any modification in this facility that would result in material change in the quality or quantity of discharge, or any material change in the location of discharge, the Discharger shall report all pertinent information in writing to the Regional Board's Executive Officer and obtain revised waste discharge requirements before any modification is implemented.

6. All permanent containment structures and erosion and drainage control systems shall be certified by a California Registered Civil Engineer or Certified Engineering Geologist as meeting the prescriptive standards and performance goals.

7. The Discharger shall ensure that all site-operating personnel are familiar with the content of these WDRs, and shall maintain a copy of these WDRs at the site.

8. These WDRs do not authorize violation of any federal, state, or local laws or regulations.

9. The Discharger shall allow the Regional Board, or an authorized representative, upon presentation of credential and other documents as may be required by law, to:

    a. Enter upon the premises regulated by these WDRs, or the place where records must be kept under the conditions of these WDRs;

    b. Have access to and copy, at reasonable times, any records that shall be kept under the condition of these WDRs;

    c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under these WDRs; and

    d. Sample or monitor at reasonable times, for the purpose of assuring compliance with these WDRs or as otherwise authorized by the CWC or California Code of Regulations, any substances or parameters at this location.

10. The Discharger shall comply with all of the conditions of these WDRs. Any noncompliance with these WDRs constitutes a violation of the Porter-Cologne Water Quality Act and may be grounds for enforcement action.

11. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with these WDRs. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.

12. These WDRs do not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.

13. The Discharger shall comply with the following:

    a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. The Discharger shall retain records of all monitoring information, copies of all reports required by these WDRs, and records of all data used to complete the application for these WDRs, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Board's Executive Officer at any time.

c. Records of monitoring information shall include:

   i. The date, exact places, and time of sampling or measurements.
   ii. The individual(s) who performed the sampling or measurements.
   iii. The date(s) analyses were performed.
   iv. The individual(s) responsible for reviewing the analyses.
   v. The results of such analyses.

d. Monitoring must be conducted according to test procedures described in the attached Monitoring and Reporting Program, Appendix D, unless other test procedures have been specified in these WDRs or approved by the Regional Board's Executive Officer.

14. All monitoring systems shall be readily accessible for sampling and inspection.

15. The Discharger is the responsible party for the WDRs, and the monitoring and reporting program for the Facility. The Discharger shall comply with all conditions of these WDRs. Violations may result in enforcement actions, requiring corrective action or imposing civil monetary liability.

16. The Discharger shall furnish, under penalty of perjury, technical monitoring program reports, and such reports shall be submitted in accordance with the specifications prepared by the Regional Board's Executive Officer. Such specifications are subject to periodic revisions as may be warranted.

17. The Discharger may be required to submit technical reports as directed by the Regional Board's Executive Officer.

18. The procedure for preparing samples for the analyses shall be consistent with the attached Monitoring and Reporting Program, Appendix D, and any future revisions thereto. The Monitoring Reports shall be certified to be true and correct, and signed, under penalty of perjury, by an authorized official of the company. All technical reports require the signature of a California Registered Professional Engineer or Professional Geologist.

19. All monitoring shall be done as described in Title 27 of the CCRs.

SOIL AND WATER
APPENDIX D

Waste Discharge Requirement
Monitoring and Reporting Program

SOIL AND WATER RESOURCES – APPENDIX D

MONITORING AND REPORTING PROGRAM--Genesis Solar LLC, Owner/Operator, Genesis Solar Power Project, Riverside County

PART I

GENERAL REQUIREMENTS

A. GENERAL

A Discharger who owns or operates a Class II Surface Impoundment is required to comply with the provisions of Title 27, Division 2, Chapter 3, Subchapter 3, Article 1 of the California Code of Regulations for the purpose of detecting, characterizing, and responding to releases to the groundwater. Section 13267, California Water Code (CWC) gives the Colorado River Basin Regional Water Quality Control Board (Regional Board) authority to require monitoring program reports for discharges that could affect the quality of waters within its region.

1. This Monitoring and Reporting Program (MRP) is Appendix D of the WDRs set forth in Appendices A and B, and are incorporated herein by this reference...The principal purpose of this self-monitoring program is:

    a. To document compliance with Waste Discharge Requirements (WDRs), and prohibitions established by the Regional Board;

    b. To facilitate self-policing by the Discharger in the prevention and abatement of pollution arising from waste discharge;

    c. To conduct water quality analyses.

2. The Regional Board Executive Officer may alter the monitoring parameters, monitoring locations, and/or the monitoring frequency during the course of this monitoring program.

B. DEFINITION OF TERMS

1. Affected Persons – all persons who either own or occupy land outside the boundaries of the parcel upon which a waste management unit (surface impoundment or impoundment) is located that has been or may be affected by the release of waste constituents from the unit.

2. Background Monitoring Point – a device (e.g. well) or location (e.g. a specific point along a lakeshore) that is upgradient or side gradient from the impoundment assigned by this MRP, where water quality samples are taken that are not affected by a release from the impoundment and that are used as a basis of comparison against samples taken from downgradient Monitoring Points.

3. Constituents of Concern (COCs) – those constituents likely to be in the waste, or derived from waste constituents in the event of a release from the impoundment.

4. Matrix Effect – refers to any change in the Method Detection Limit (MDL) or Practical Quantitation Limit (PQL) for a given constituent as a result of the presence of other constituents - either of natural origin or introduced through a spill or release - that are present in the sample being analyzed.

5. Method Detection Limit (MDL) – the lowest constituent concentration that can support a non-zero analytical result with 99 percent reliability. The MDL is laboratory specific and should reflect the detection capabilities of specific procedures and equipment used by the laboratory.

6. Monitored Media – water - bearing media monitored pursuant to this Monitoring and Reporting Program. The Monitored Media may include: (1) groundwater in the uppermost aquifer, in any other portion of the zone of saturation (as defined in Title 27, Section 20164) in which it would be reasonable to anticipate that waste constituents migrating from the surface impoundment could be detected, and in any perched zones underlying the impoundment, (2) any bodies of surface water that could be measurably affected by a release, (3) soil-pore liquid beneath and/or adjacent to the surface impoundment, and (4) soil-pore gas beneath and/or adjacent to the surface impoundment.

7. Monitoring Parameters – the list of constituents and parameters used for the majority of monitoring activity.

8. Monitoring Point – a device (e.g. well) or location (e.g. a specific point along a lakeshore) that is downgradient from the surface impoundment assigned by this MRP, at which samples are collected for the purpose of detecting a release by comparison with samples collected at Background Monitoring Points.

9. Practical Quantification Limit (PQL) – the lowest constituent concentration at which a numerical concentration can be assigned with a 99 percent certainty that its value is within 10 percent of the actual concentration in the sample. The PQL is laboratory specific and should reflect the detection capabilities of specific procedures and equipment used by the laboratory.

10. Reporting Period – the duration separating the submittal of a given type of monitoring report from the time the next iteration of that report is scheduled for submittal. Unless

otherwise stated, the due date for any given report shall be 30 days after the end of its Reporting Period.

11. Sample Locations -

    a. For Monitoring Points – the number of data points obtained from a given Monitoring Point during a given Reporting Period – used for carrying out the statistical or non-statistical analysis of a given analyte during a given Reporting Period.

    b. For Background Monitoring Points – the number of new and existing data points from all applicable Background Monitoring Points in a given Monitored Medium – used to collectively represent the background concentration and variability of a given analyte in carrying out a statistical or non-statistical analysis of that analyte during a given Reporting Period.

12. Uppermost Aquifer – the geologic formation nearest the natural ground surface that is an aquifer, as well as, lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.

13. Volatile Organic Constituents (VOCs) – the suite of organic constituents having a high vapor pressure. The term includes at least the 47 organic constituents listed in Appendix I to 40 CFR Part 258.

14. VOC_{wate} – the composite monitoring parameter that includes all VOCs that are detectable in less than 10 percent of the applicable background samples. This parameter is analyzed, using the non-statistical method described in Part III.A.2. of this MRP, to identify releases of VOCs that are detected too infrequently in backgroundwater to allow for statistical analysis.

C. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analysis shall be performed according to the most recent version of Standard USEPA methods, and California ELPA rulings. Water and waste analysis shall be performed by a laboratory approved for these analyses by the California Department of Public Health. Specific methods of analysis must be identified. If methods other than USEPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and approval by the Regional Board Executive Officer prior to use. The director of the laboratory whose name appears on the certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Regional Board. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurement. In addition, the Discharger is responsible for verifying that laboratory analysis of all samples from Monitoring Points and Background Monitoring Points meet the following restrictions:

1. Methods, analysis, and detection limits used must be appropriate for expected concentrations. For detection monitoring of any constituent or parameter found in concentrations that produce more than 90% non-numerical determinations (i.e. "trace" or "ND") in data from Background Monitoring Points for that medium, the analytical methods having the lowest "facility-specific method detection limit (MDL)", defined in Part I.B.5., shall be selected from among those methods that provide valid results in light of any "Matrix Effects" (defined in Part I.B.4.) involved.

2. Analytical results falling between the MDL and the PQL shall be reported as “trace”, and shall be accompanied both by the estimated MDL and PQL values for that analytical run, and by an estimate of the constituent's concentration.

3. MDLs and PQLs shall be derived by the laboratory for each analytical procedure, according to State of California laboratory accreditation procedures. These MDLs and PQLs shall reflect the detection and quantitation capabilities of the specific equipment used by the lab. If the lab suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived MDL/PQL values, the results shall be flagged accordingly, along with an estimate of the detection limit and quantitation limit actually achieved.

4. All Quality Assurance/Quality Control (QA/QC) data shall be reported, along with the sample results to which it applies, including the method, equipment, and analytical detection limits, the recovery rates, an explanation of any recovery rate that is less than 80%, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name and qualifications of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recovery.

5. Upon receiving written approval from the Regional Board Executive Officer, an alternative statistical or non-statistical procedure can be used for determining the significance of analytical results for a constituent that is a common laboratory contaminant (i.e., methylene chloride, acetone, diethylhexyl phthalate, and di-n-octyl phthalate) during any given Reporting Period in which QA/QC samples show evidence of laboratory contamination for that constituent. Nevertheless, analytical results involving detection of these analytes in any background or downgradient sample shall be reported and flagged for easy reference by Regional Board staff.

6. In cases where contaminants are detected in QA/QC samples (i.e. field, trip, or lab blanks), the accompanying sample results shall be appropriately flagged.

7. The MDL shall always be calculated such that it represents a concentration associated with a 99% reliability of a non-zero result.

D. RECORDS TO BE MAINTAINED

Written reports shall be maintained by the Discharger or laboratory, and shall be retained for a minimum of five (5) years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board. Such records shall show the following for each sample:

1. Identity of sample and of the Monitoring Point or Background Monitoring Point from which it was taken, along with the identity of the individual who obtained the sample;

2. Date and time of sampling;

3. Date and time that analyses were started and completed, and the initials of the personnel performing each analysis;

4. Complete procedure used, including method of preserving the sample, and the identity and volumes of reagents used;

5. Calculations of results; and

6. Results of analyses, and the MDL and PQL for each analysis.

E. REPORTS TO BE FILED WITH THE REGIONAL BOARD

1. Detection Monitoring Reports – For each Monitored Medium, all Monitoring Points and Background Monitoring Points assigned to detection monitoring under Part II.A.7 of this MRP shall be monitored **semiannually** for the Monitoring Parameters (Part II.A.4). A "Detection Monitoring Report" shall be submitted to the Regional Board in accordance with the schedule contained in the Summary of Self-Monitoring and Reporting Requirements, and shall include the following:

    a. A Letter of Transmittal that summarizes the essential points in each report shall accompany each report submittal. The letter of transmittal shall be signed by a principal executive officer at the level of vice-president or above, or by his/her duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates. The letter of transmittal shall include:

        i. A discussion of any violations noted since the previous report submittal and a description of the actions taken or planned for correcting those violations. If no violations have occurred since the last submittal, that should be so stated;

ii. If the Discharger has previously submitted a detailed time schedule or plan for correcting any violations, a progress report on the time schedule and status of the corrective actions being taken; and

iii. A statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true, complete, and correct.

b. A Compliance Evaluation Summary shall be included in each Detection Monitoring Report. The compliance evaluation summary shall contain at least:

i. Velocity and direction of groundwater flow for each monitored groundwater body under and around the surface impoundment based upon the water level elevations taken during the collection of water quality data. A description and graphical presentation (e.g., arrow on a map) shall be submitted;

ii. Methods used for water level measurement and pre-sampling purging for each monitoring well addressed by the report including:

1. Method, time, and equipment used for water level measurement;
2. Type of pump used for purging, placement of the pump in the well, pumping rate, and well recovery rate;
3. Methods and results of field testing for pH, temperature, electrical conductivity, and turbidity, including;

a. Equipment calibration methods, and
b. Method for disposing of purge water

iii. Methods used for sampling each Monitoring Point and Background Monitoring Point, including:

1. A description of the type of pump, or other device used, and its placement for sampling;
2. A detailed description of the sampling procedure: number and description of samples, field blanks, travel blanks, and duplicate samples; types of containers and preservatives used; date and time of sampling; name and qualifications of individual collecting samples, and other relevant observations;

c. A map or aerial photograph showing the locations of Monitoring Points, and Background Monitoring Points;

d. For each Detection Monitoring Report, provide all relevant laboratory information including results of all analyses, and other information needed to demonstrate compliance with Part I.C.;

e. An evaluation of the effectiveness of the run-off/run-on control facilities;

f. A summary of reportable spills/leaks occurring during the reporting period; include estimated volume of liquids/solids discharged outside designated containment area, a description of management practices to address spills/leaks, and actions taken to prevent reoccurrence.

2. Annual Summary Report – The Discharger shall submit to the Regional Board, an "Annual Summary Report" for the period extending from January 1 through December 31. The "Annual Summary Report" is due **March 15** of each year, and shall include the following:

   a. A graphical presentation of analytical data for each Monitoring Point and Background Monitoring Point (Title 27, Section 20415(e)(14)). The Discharger shall submit, in graphical format, the laboratory analytical data for all samples taken within at least the previous five (5) calendar years. Each such graph shall plot the concentration of one (1) or more constituents over time for a given Monitoring Point and Background Monitoring Point, at a scale appropriate to show trends or variations in water quality. The graphs shall plot each datum, rather than plotting mean values. For any given constituent or parameter, the scale for background plots shall be the same as that used to plot downgradient data. On the basis of any aberrations noted in the plotted data, the Regional Board Executive Officer may direct the Discharger to carry out a preliminary investigation (Title 27, Section 20080(d)(2)), the results of which will determine whether or not a release is indicated;

   b. A tabular presentation of all monitoring analytical data obtained during the previous two (2) Monitoring and Reporting Periods, submitted on hard copy within the annual report as well as digitally on electronic media in a file format acceptable to the Regional Board Executive Officer (Title 27, Section 20420(h)). The Regional Board regards the submittal of data in hard copy and on diskette CD-ROM as "...a form necessary for..." statistical analysis in that this facilitates periodic review by the Regional Board statistical consultant;

   c. A comprehensive discussion of the compliance record and any corrective actions taken or planned, which may be needed to bring the Discharger into full compliance with WDRs;

   d. A written summary of the groundwater analyses, indicating changes made since the previous annual report; and

   e. An evaluation of the effectiveness of the run on/run-off control facilities, pursuant to Title 27, Section 20365.

3. Contingency Reporting

a. The Discharger shall report any spill of HTL or evaporation pond liquid by telephone within 48 hours of discovery. The reportable quantity for evaporation pond liquid is 150 gallons.

   After reporting a spill, a written report shall be filed with the Regional Board Executive Officer within seven (7) days, containing at a minimum the following:

   i. A map showing the location(s) of the discharge/spill;

   ii. A description of the nature of the discharge (all pertinent observations and analyses including quantity, duration, etc.); and

   iii. Corrective measures underway or proposed.

b. Should the initial statistical comparison (Part III.A.1.) or non-statistical comparison (Part III.A.2.) indicate, for any Constituent of Concern or Monitoring Parameter, that a release is tentatively identified, the Discharger shall immediately notify the Regional Board verbally as to the Monitoring Point(s) and constituent(s) or parameter(s) involved, shall provide written notification by certified mail within seven (7) days of such determination (Title 27, Section 20420(j)(1)), and shall conduct a discrete retest in accordance with Part III.A.3. If the retest confirms the existence of a release, the Discharger shall carry out the requirements of Part I.E.3.d. In any case, the Discharger shall inform the Regional Board of the outcome of the retest as soon as the results are available, following up with written results submitted by certified mail within seven (7) days of completing the retest.

c. If either the Discharger or the Regional Board determines that there is significant physical evidence of a release (Title 27, Section 20385(a)(3)), the Discharger shall immediately notify the Regional Board of this fact by certified mail (or acknowledge the Regional Board's determination) and shall carry out the requirements of Part I.E.3.d. for all potentially-affected monitored media.

d. If the Discharger concludes that a release has been discovered:

   i. If this conclusion is <u>not</u> based upon “direct monitoring” of the Constituents of Concern, pursuant to Part II.A.5., then the Discharger shall, within thirty days, sample for all Constituents of Concern at all Monitoring Points and submit them for laboratory analysis. Within seven (7) days of receiving the laboratory analytical results, the Discharger shall notify the Regional Board, by certified mail, of the concentration of all Constituents of Concern at each Monitoring Point. Because this scan is not to be tested against background, only a single datum is required for each Constituent of Concern at each Monitoring Point (Title 27 Section 20420(k)(1));

ii. The Discharger shall, within 90 days of discovering the release (Title 27, Section 20420(k)(5)), submit a Revised Report of Waste Discharge proposing an Evaluation Monitoring Program meeting the requirements of Title 27, Section 20425; and

iii. The Discharger shall, within 180 days of discovering the release (Title 27, Section 20420(k)(6), submit a preliminary engineering feasibility study meeting the requirements of Title 27, Section 20430.

e. Any time the Discharger concludes - or the Regional Board Executive Officer directs the Discharger to conclude - that a liquid phase release from the surface impoundment has proceeded beyond the facility boundary, the Discharger shall so notify all persons who either own or reside upon the land that directly overlies any part of the plume (Affected Persons).

i. Initial notification to Affected Persons shall be accomplished within 14 days of making this conclusion and shall include a description of the Discharger's current knowledge of the nature and extent of the release; and

ii. Subsequent to initial notification, the Discharger shall provide updates to all Affected Persons, including any persons newly affected by a change in the boundary of the release, within 14 days of concluding a material change in the nature or extent of the release has occurred.

4. <u>Surface Impoundment - Leakage Detection System (LDS), and Solids Monitoring</u>

a. Sampling and reporting shall be conducted semi-annually.

b. Provide volume of solids removed from the holding pond each month for that reporting period, and transported to a waste management facility for disposal. Include name and location of waste management facility.

c. Conduct quarterly inspections of Leakage Detection System (LDS), and holding pond.

PART II

MONITORING REQUIREMENTS FOR GROUNDWATER

A. GROUNDWATER SAMPLING AND ANALYSIS FOR DETECTION MONITORING

1. Groundwater Surface Elevation and Field Parameters – Groundwater sampling and analysis shall be conducted semiannually pursuant to California ELAP rulings, and include an accurate determination of the groundwater surface elevation and field parameters (temperature, electrical conductivity, turbidity) for each Monitoring Point and Background Monitoring Point (Title 27, Section 20415(e)(13)). Groundwater elevation obtained prior to purging the well and sample collection, shall be used to fulfill the semi-annual groundwater flow rate/direction analyses required under Part I.E.1.b.i. Groundwater wells shall be gauged using an electronic sounder capable of measuring depth to groundwater within 100th of an inch. Following gauging, wells shall be purged according to EPA groundwater sampling procedures until:

   a. pH, temperature, and conductivity are stabilized within 10 percent, and
   b. turbidity has been reduced to 10 NTUs or the lowest practical levels achievable.

   The above identified parameters shall be recorded in the field, and submitted in the monitoring report. Sampling equipment shall be decontaminated between wells. Purge water may be discharged to the brine pond; discharge to the ground surface is prohibited.

2. Groundwater Sample Collection - Groundwater samples shall be collected from all monitoring points and background monitoring points after wells recharge to within at least 80 percent of their original static water level. Groundwater samples shall be collected with a paristaltic pump that is decontaminated between sampling events. Samples shall be labeled, logged on chain-of-custody forms, and placed in cold storage pending delivery to a State certified analytical laboratory.

3. Five-Day Sample Procurement Limitation – To satisfy data analysis requirements for a given reporting period, samples collected from all Monitoring Points and Background Monitoring Points shall be taken within a span not exceeding five (5) days, and shall be taken in a manner that insures sample independence to the greatest extent feasible (Title 27, Section 20415(e)(12)(B)).

4. Groundwater Monitoring Parameters for Detection Monitoring – Groundwater samples collected from monitoring points and background monitoring points shall be analyzed for the following:

Parameter	Unit	Sample Type
Chloride	mg/L	Grab

Sulfate	mg/L	Grab
Total Dissolved Solids (TDS)	mg/L	Grab
pH	#	Grab
Specific Conductance	µohms/cm	Grab
HTF	mg/L	Grab
Heavy Metals (Sb, As, Ba, Cd, Ca, Cr, Co, Cu, Pb, Hg, Ni, Se, Zn)	mg/L	Grab
Oil & Grease	mg/L	Grab

All Monitoring Points and Background Monitoring Points assigned to Detection Monitoring shall be sampled semi-annually in **June** and **December** of each year in accordance with Part I of this MRP. Monitoring results shall be reported in the semi-annual Detection Monitoring Report.

5. Data Analysis – Statistical or non-statistical analysis shall be carried out as soon as the data is available, in accordance with Part III of this monitoring program.

   Monitoring Points and Background Monitoring Points – At a minimum of 90 days prior to the operation of the facility, the Discharger shall submit a proposed groundwater monitoring program, including background and detection monitoring locations, to the Executive Officer for review and approval.

6. Initial Background Determination: For the purpose of establishing an initial pool of background data for each Constituent of Concern at each Background Monitoring Point (Title 27, Section 20415(e)(6)):

   a. Whenever a new Constituent of Concern is added to the Water Quality Protection Standard, including any added by the adoption of this Board Order, the Discharger shall collect at least one (1) sample **quarterly** for at least one (1) year from each Background Monitoring Point in each monitored medium and analyze for the newly-added constituent(s); and

   b. Whenever a new Background Monitoring Point is added, including any added by this Board Order, the Discharger shall sample the new monitoring point at least **quarterly** for at least one (1) year, analyzing for all Constituents of Concern and Monitoring Parameters.

7. Semiannual Determination of Groundwater Flow Rate/Direction (Title 27, Section 20415(e)(15): The Discharger shall measure the water level in each well and determine groundwater flow rate and direction in each groundwater body described in Part II.A.1. at least semiannually. This information shall be included in the semi-annual Detection Monitoring Reports required under Part I.E.1.

PART III

STATISTICAL AND NON-STATISTICAL ANALYSES

A. STATISTICAL AND NON-STATISTICAL ANALYSIS

The Discharger shall use the most appropriate of the following methods to compare the downgradient concentration of each monitored constituent or parameter with its respective background concentration to determine if there has been a release from the surface impoundment. For any given data set, proceed sequentially down the list of statistical analysis methods listed in Part III.A.1., followed by the non-statistical method in Part III.A.2., using the first method for which the data qualifies. If that analysis tentatively indicates the detection of a release, implement the retest procedure under Part III.A.3.

1. Statistical Methods. The Discharger shall use one (1) of the following statistical methods to analyze Constituents of Concern or Monitoring Parameters that exhibit concentrations exceeding their respective MDL in at least ten percent of the background samples taken during that Reporting Period. Each of these statistical methods is more fully described in the Statistical Methods discussion below. Except for pH, which uses a two-tailed approach, the statistical analysis for all constituents and parameters shall be a one-tailed (testing only for statistically significant increase relative to background) approach:

    a. One-Way Parametric Analysis of Variance (ANOVA) followed by multiple comparisons (Title 27, Section 20415(e)(8)) – This method requires at least four (4) independent samples from each Monitoring Point and Background Monitoring Point during each sampling episode. It shall be used when the background data for the parameter or constituent obtained during a given sampling period, has not more than 15% of the data below PQL. Prior to analysis, replace all 'trace' determinations with a value halfway between the PQL and the MDL values reported for that sample run, and replace all "non-detect" determinations with a value equal to half the MDL value reported for that sample run. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis (i.e., that there is no release) to be rejected at any Monitoring Point, the Discharger shall conclude that a release is tentatively indicated from that parameter or constituent; or

    b. One-Way Non-Parametric ANOVA (Kruskal-Wallis Test), followed by multiple comparisons – This method requires at least nine (9) independent samples from each Monitoring Point and Background Monitoring Point; therefore, the Discharger shall anticipate the need for taking more than four (4) samples per Monitoring Point, based upon past monitoring results. This method shall be used when the pooled background data for the parameter or constituent, obtained within a given

sampling period, has not more than 50% of the data below the PQL. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis (i.e., that there is no release) to be rejected at any Monitoring Point, the Discharger shall conclude that a release is tentatively indicated for that parameter or constituent; or

c. Method of Proportions – This method shall be used if the "combined data set" – the data from a given Monitoring Point in combination with the data from the Background Monitoring Points – has between 50% and 90% of the data below the MDL for the constituent or parameter in question. This method; (1) requires at least nine (9) downgradient data points per Monitoring Point per Reporting Period, (2) requires at least thirty data points in the combined data set, and (3) requires that $n * P > 5$ (where n is the number of data points in the combined data set and P is the proportion of the combined set that exceeds the MDL); therefore, the Discharger shall anticipate the number of samples required, based upon past monitoring results. The test shall be carried out at the 99% confidence level. If the analysis results in rejection of the Null Hypothesis (i.e., that there is no release), the Discharger shall conclude that a release is tentatively indicated for that constituent or parameter; or

d. Other Statistical Methods. – These include methods pursuant to Title 27, Section 20415(e)(8)(c-e).

2. Non-Statistical Method. The Discharger shall use the following non-statistical methods for all constituents that are not amenable to statistical analysis by virtue of having been detected in less than 10% of applicable background samples. A separate variant of this test is used for the VOC_{water} Composite Monitoring Parameters. Regardless of the test variant used, the method involves a two-step process: (1) from all constituents to which the test variant applies, compile a list of those constituents which equal or exceed their respective MDL in the downgradient sample from a given Monitoring Point, then (2) evaluate whether the listed constituents meet either of the test variant's two possible triggering conditions. For each Monitoring Point, the list described above shall be compiled based on either the data from a single sample taken during the Monitoring Period for that Monitoring Point, or (where several independent samples have been analyzed for that constituent at a given Monitoring Point) from the sample that contains the largest number of detected constituents. Background shall be represented by the data from all samples taken from the appropriate Background Monitoring Points during that Reporting Period (at least one (1) sample from each Background Monitoring Point). The method shall be implemented as follows:

a. VOC_{water} Composite Monitoring Parameter – For any given Monitoring Point, the VOC_{water} Monitoring Parameter is a composite parameter addressing all detectable VOCs including at least all 47 VOCs listed in Appendix I to 40 CFR 258 and all unidentified peaks. The Discharger shall compile a list of each VOC which (1)

exceeds its MDL in the Monitoring Point sample (an unidentified peak is compared to its presumed (MDL), and also (2) exceeds its MDL in less than ten percent of the samples taken during that Reporting Period from that medium's Background Monitoring Points. The Discharger shall conclude that a release is tentatively indicated for the VOC_{water} composite Monitoring Parameter if the list either (1) contains two or more constituents, or (2) contains one constituent that exceeds its PQL;

b. Constituents of Concern: As part of the COC monitoring required under Part 2.A.5 of this MRP, for each Monitoring Point, the Discharger shall compile a list of COCs that exceed their respective MDL at the Monitoring Point, yet do so in less than ten percent of the background samples taken during that Reporting Period. The Discharger shall conclude that a release is tentatively indicated if the list either (1) contains two or more constituents, or (2) contains one constituent that exceeds its PQL.

3. Discrete Retest – In the event that the Discharger concludes that a release has been tentatively indicated (under Parts III.A.1. or III.A.2.), the Discharger shall, within 30 days of that conclusion, collect two (2) new suites of samples for the indicated Constituent(s) of Concern or Monitoring Parameter(s) at each indicated Monitoring Point, collecting at least as many samples per suite as were used for the initial test. Re-sampling of Background Monitoring Points is optional. As soon as the retest data is available, the Discharger shall use the same statistical method or non-statistical comparison separately on each suite of retest data. For any indicated Monitoring Parameter or Constituent of Concern at an affected Monitoring Point, if the test results of either (or both) of the retest data suites confirms the original indication, the Discharger shall conclude that a release has been discovered. All retests shall be carried out only for the Monitoring Point(s) for which a release is tentatively indicated, and only for the Constituent of Concern or Monitoring Parameter that triggered the indication there, as follows:

a. If an ANOVA method was used in the initial test, the retest shall involve only a repeat of the multiple comparison procedure, carried out separately on each of the two (2) new suites of samples taken from the indicating Monitoring Point;

b. If the Method of Proportions statistical test was used, the retest shall consist of a full repeat of the statistical test for the indicated constituent or parameter, carried out separately on each of the two (2) new sample suites from the indicating Monitoring Point;

c. If the non-statistical comparison was used:

i. Because the VOC Composite Monitoring parameters (VOC_{water}) each address, as a single parameter, an entire family of constituents which are likely to be present in any surface impoundment release, the scope of the laboratory analysis for each retest sample shall include all VOCs detectable in that retest

sample. Therefore, a confirming retest for either parameter shall have validated the original indication even if the suite of constituents in the confirming retest sample(s) differs from that in the sample that initiated the retest;

ii. Because all Constituents of Concern that are jointly addressed in the non-statistical testing under Part III.A.2. remain as individual Constituents of Concern, the scope of the laboratory analysis for the non-statistical retest samples shall be narrowed to involve only those constituents detected in the sample which initiated the retest.

SUMMARY OF SELF-MONITORING AND REPORTING REQUIREMENTS

A. GROUNDWATER MONITORING

1. Groundwater monitoring wells shall be sampled/analyzed semi-annually for the following parameters/constituents:

Parameters & Constituent	Unit	Type of Sample	Reporting Frequency
a. Chloride	mg/L	grab	semiannual
b. Sulfate	mg/L	grab	semiannual
Total Dissolved Solids (TDS)	mg/L	grab	semiannual
c. PH	#	field measurement	semiannual
d. Specific Conductance	μohms/cm	field measurement	semiannual
e. HTF	mg/L	grab	semiannual
f. Heavy Metals (Sb,As, Ba, Cd, Ca, Cr, Co, Cu, Pb, Hg, Ni, Se, Zn)	mg/L	grab	semiannual
g. Oil & Grease	mg/L	grab	semiannual

2. The collection, preservation, and holding times of all samples shall be in accordance with the U.S. Environmental Protection Agency approved procedures. All analyses shall be conducted by a laboratory certified by the California Department of Public Health to perform the required analyses.

B. SURFACE IMPOUNDMENT: Leakage Detection System (LDS), and Solids Monitoring

	Unit	Observation or Sampling Frequency	Reporting Frequency
1. Estimated volume of solid/liquid in holding pond	ft^3	Monthly	semiannual
2. Measurement of freeboard	ft	Monthly	semiannual
3. Volume of solids removed and shipped to off site waste management facility	tons	Monthly	semiannual

C. MONITORING REORTS AND OBSERVATION SCHEDULE

"Reporting Period" means the duration separating the submittal of a given type of monitoring report from the time the next iteration of that report is scheduled for submittal. An annual report, which is a summary of all the monitoring during the previous year, shall also be submitted to the Regional Board. The submittal dates for Detection Monitoring Reports and the Annual Summary Report are as follows:

1. <u>Detection Monitoring Reports</u>

a. 1st Semiannual Report (January 1 through June 30) – report due by **<u>August 1</u>**

b. 2nd Semiannual Report (July 1 through December 31) – report due by **<u>March 1</u>**

2. <u>Annual Summary Report</u>

January 1 through December 31 – report due **<u>March 15</u>** of the following year.

3. The Detection Monitoring Reports and the Annual Summary Report shall include the following:

a. The Discharger shall arrange the data in tabular form so that the specified information is readily discernible. The data shall be summarized in such a manner as to clearly illustrate whether the facility is operating in compliance with WDRs.

b. Records of monitoring information shall include:

i. The date, exact place, and time of sampling or measurement;
ii. The individual performing the sampling or measurement;
iii. The date the analysis was performed;
iv. The initials of the individual performing the analysis;
v. The analytical technique or method used; and
vi. The result of the analysis.

c. Each report shall contain the following statement:

"I declare under the penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations."

d. A duly authorized representative of the Discharger may sign the documents if:

i. Authorization is made in writing by the person described in Part I.E.1.a;

ii. Authorization specifies an individual or person having responsibility for the overall operation of the regulated disposal system; and

iii. Written authorization is submitted to the Regional Board Executive Officer.

iv. Monitoring reports shall be certified under penalty of perjury to be true and correct, and shall contain the required information at the frequency designated in this monitoring report.

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APPENDIX E (SOIL & WATER REPORT)

Date:	February 26, 2010
To:	Susan Sanders
CC:	Susan Lee, Mike Monasmith, CEC workgroup for Genesis
From:	Andrew Collison, Ph.D.
PWA Project #:	#2006.00 CEC Genesis
Subject:	**Geomorphic assessment of Genesis Solar project site**

Objectives of this Appendix:

1. Provide a brief description of the project area's sand dunes and a discussion of the sand transport processes that created and now maintain the existing dunes.

2. Discussion of potential direct and indirect impacts of the proposed project and its alternative on the existing sand dune system and the processes that support them.

3. Mitigation for those impacts, or a well-supported conclusion that those impacts cannot be mitigated.

Summary of Key Findings

PWA has reviewed the applicant's geomorphic review of the Genesis project site entitled "Aeolian transport evaluation and ancient shoreline delineation report", Worley Parsons, February 5th 2010. I visited the western part of the field site with the report's author, Dr. Miles Kenney, to assess the accuracy of the mapping and conclusions, and carried out a desk study for the eastern side of the project based on aerial photos, literature sources and experience in similar locations. I am largely in agreement with the report conclusions regarding the western solar array: it is located on two land surface units that are relatively geomorphically stable and that are not part of an active wind transport corridor. There are no large washes in this part of the site that carry large amounts of sediment across the project site. As a result there should not be significant off-site geomorphic impacts from the western solar array or project components. There will be some disruption of drainage from capturing a large number of small ephemeral washes that currently cross the project site from north to south, diverting them around the property and discharging them back on to the fan surface. I have investigated a similar reference site 12 miles to the west of the Genesis site where I10 drainage is captured over a similar area, concentrated into a single channel and released back on to the fan surface. This site suggests that it is feasible to capture drainages and redistribute them on the alluvial fan with relatively minor impacts, though care will be needed in the design of this system.

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The eastern solar array is somewhat more complex since it overlays a larger and more active ephemeral wash and it intrudes into the outer edges of two wind-borne sand transport corridors that deliver sand to ecologically-significant dune habitat downwind, including habitat that supports Mojave Fringe Toed Lizard. The degree of intrusion is somewhat hard to estimate since both wind corridors have poorly defined edges, and because sand transport rates vary greatly across the corridor width. By the applicant's estimation (Worley Parsons, 2010) the eastern solar array intrudes across 19% of the width of the Palen-McCoy corridor, and 7% of the Chuckwalla corridor. These delineations appear reasonable based on a field and aerial photo analysis, and by comparison with the NECO land classification maps (BLM CDD, 2002). There is good evidence from the field and the Worley Parsons report to demonstrate that the rate of sand transport is relatively low in the edges of the corridor where the project footprint is proposed, with most of the sand volume being transported in more central parts of the corridor. The overall disruption to sand delivery is conservatively estimated by this author to be less than 10% for the Palen-McCoy transport corridor and less than 6% for the Chuckwalla corridor. Note however that the project laterals will pass through the core of the Palen-McCoy corridor where there is a much higher rate of sediment transport, and will need to be designed to minimize disruption of sand transport by both wind and water. This will preclude the use of wind fences beyond the initial construction period, and will require keeping infrastructure below or at ground level where possible, and avoiding constructing berms or drainage channels that trap sediment or disrupt channel processes.

Although the magnitude of sand reduction from the eastern solar array is not believed to be great in terms of regional sand transport patterns along the Chuckwalla Valley, an area of approximately 453 acres of sandy plains and partially stabilized vegetated sand dunes immediately downwind of the eastern solar array will be indirectly impacted by the project, with wind-borne sand being cut off by the project footprint. Based on previous studies on the effects of wind breaks on sand dune habitat in the Coachella Valley (Turner et. al. 1984), this area is likely to experience deflation (blowing away of sand from the dunes) and potential loss of sandy habitat within a few years of the project's construction.

A large wash complex that currently crosses the eastern side of the proposed eastern solar array will be captured and redirected around the project footprint. Unlike the small washes that cross the western solar array site, this wash complex appears to supply a large amount of sand to the surrounding area (under the proposed eastern solar array). It appears that it may be possible to redirect this wash east of the project site in a natural (earth rather than concrete or soil cement) channel, to minimize erosion and habitat impacts. As with the western solar array, the applicant proposes to capture small drainages and pass them around the project footprint before dispersing them downstream. This should be feasible without major impacts downstream provided that the drainage plan is well designed and implemented.

Relationship Between Hydro-Geomorphic Processes and Biological Resources

This Appendix focuses on several hydro-geomorphic processes that play a significant role in the health of the ecosystem of the project site and its surroundings. These processes are wind transportation of sand relative to the creation, preservation and destruction of sand dunes, and water transport of sediment through the alluvial fan drainage system.

Wind Transport

The Fringe Toed Lizard relies on active sand dunes and a regular supply of fine wind blown sand for its habitat (Figure 1). Active sand dunes (dunes that have an active layer of mobile sand) exist in a state of dynamic equilibrium: they are continuously losing sand downwind due to erosion and transport, but that is offset by supplies of new sand from upwind (see Figure 2). If the upwind sand supply is cut off the dunes *deflate*; that is to say they lose sand downwind and shrink in size and depth (see Figure 3 for an example). The finest sand (which is most easily transported) is lost first with coarser sand and gravel being left behind to form an armor or lag. This combination of lag and thin sand deposits does not support FTL habitat.

Maintaining FTL habitat requires the regular addition of wind-blown sand from a reliable source. Most of the sand in the Chuckwalla Valley is transported via a series of sand transport corridors, controlled by wind direction and the availability of loose sand to be transported. The applicant's sand dune report (Worley Parsons, 2010) provides a good explanation of the location of these corridors relative to the project site. The main Chuckwalla Valley corridor runs west to east across the southern edge of the proposed Genesis project, while the Palen-McCoy corridor runs through the eastern edge of the site. Sand delivered from upwind passes through dune areas including FTL habitat and is deposited, replenishing sand that has been lost downwind. In addition to the direct biological impact of constructing a project in a dune area (direct loss of habitat), construction activities have two potential offsite impacts on sand transport corridors. Firstly, if the project footprint is constructed in a dune area it will cut off a supply of sand that would otherwise have been transported downwind to other dune areas. Dunes downwind of a constructed site will deflate over time as sand output is not matched by sand input. Secondly, new sand that would have been transported across the project footprint from upwind will potentially be cut off by drainage ditches, wind fences and above ground infrastructure. Thus, if a project is built into a wind corridor it will create a 'sand shadow' area where dune deflation occurs over time.

Turner et al (1984) conducted experiments on paired plots of sand dunes up and downwind of wind barriers. They showed that 'sand shadows' formed within 4-17 years of the erection of a relatively small wind barrier (a single line of tamarisk trees) and that while FTL were abundant upwind of the barriers they were virtually absent downwind. Thus barriers pose a direct threat to sand transport and habitat.

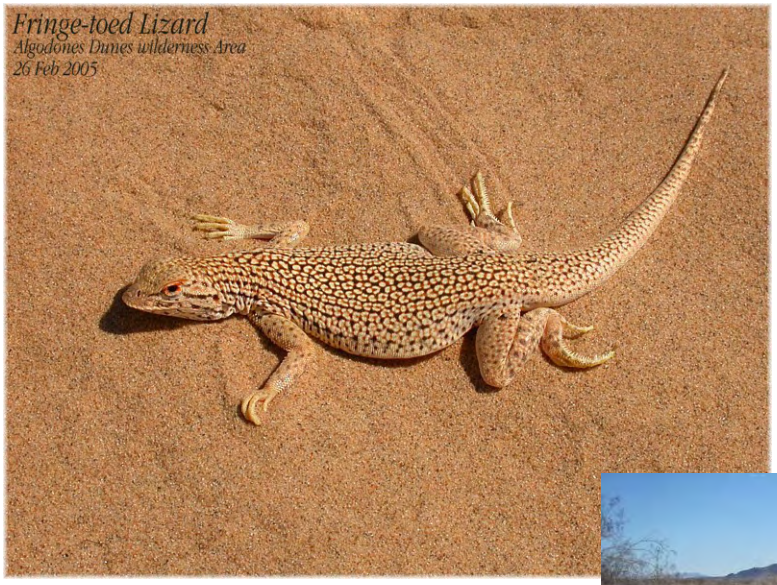


Figure 1. Fringe Toed Lizard showing its preferred habitat of fine, loose sand. Source: Southwest Images.

Figure 2. Potential FTL habitat showing 'plump', vegetated dunes connected by relatively deep, loose sand sheets with active sand movement.

Figure 3. Deflated former vegetated dune showing remnants of eroding dune under creosote bushes surrounded by shallow, compacted sand. This habitat does not support FTL.

Figure 4. Sparse sand on an alluvial fan area away from a major wash (note photos are not from Genesis – shown to illustrate the concept)

Figure 5. Much sandier conditions than Figure 4 in a large wash complex indicating sand transport from the channel to the surrounding alluvial fan. (Note photos are not from Genesis – shown to illustrate the concept.)

Sand Transport by Alluvial Fan Washes

In addition to the regional wind transport corridor sand can also be transported locally by washes. These carry sediment from upstream and distribute it on the alluvial fan where it is available to wind transport, creating smaller sand corridors around the main washes. The large wash complex that passes east of the solar arrays and is crossed by the laterals likely functions in this way.

Disrupting the drainage pattern (for example by channelizing the washes in hydraulically-efficient concrete channels deep below the fan surface) is likely to move sediment downstream at the expense of the surrounding habitat corridor. (The area where the channel discharges may however benefit from greater-than-before sand delivery.)

Description of the Genesis Project Sites

I visited the Genesis project site on January 12th 2010. Conditions on January 12th were warm and dry, with no recent rain. I visited the area of active sand dunes in the Wiley Wells Rest Stop where the proposed lateral meet I10, traversed the Chuckwalla Valley sand transportation corridor, hiked in to the western boundary of the property and hiked a loop of approximately 3 miles in the proposed western solar array area. On a subsequent visit to the Palen project site located 12 miles west of Genesis I visited a large ephemeral wash that passed under I10 to assess the effects of concentrating several small washes into a single channel, as a reference condition for potential site drainage approaches on Genesis.

The site is located on an alluvial fan that drains from north to south towards Ford Dry Lake. The average gradient is about 0.5 degree. There are a series of different geological units that underlay the site and its laterals (shown in Figure 4 below). The boundaries between these areas are somewhat interwoven and gradual, but can be seen on aerial photos and in the field. In addition there are a series of smaller land units that cut across the major land units.

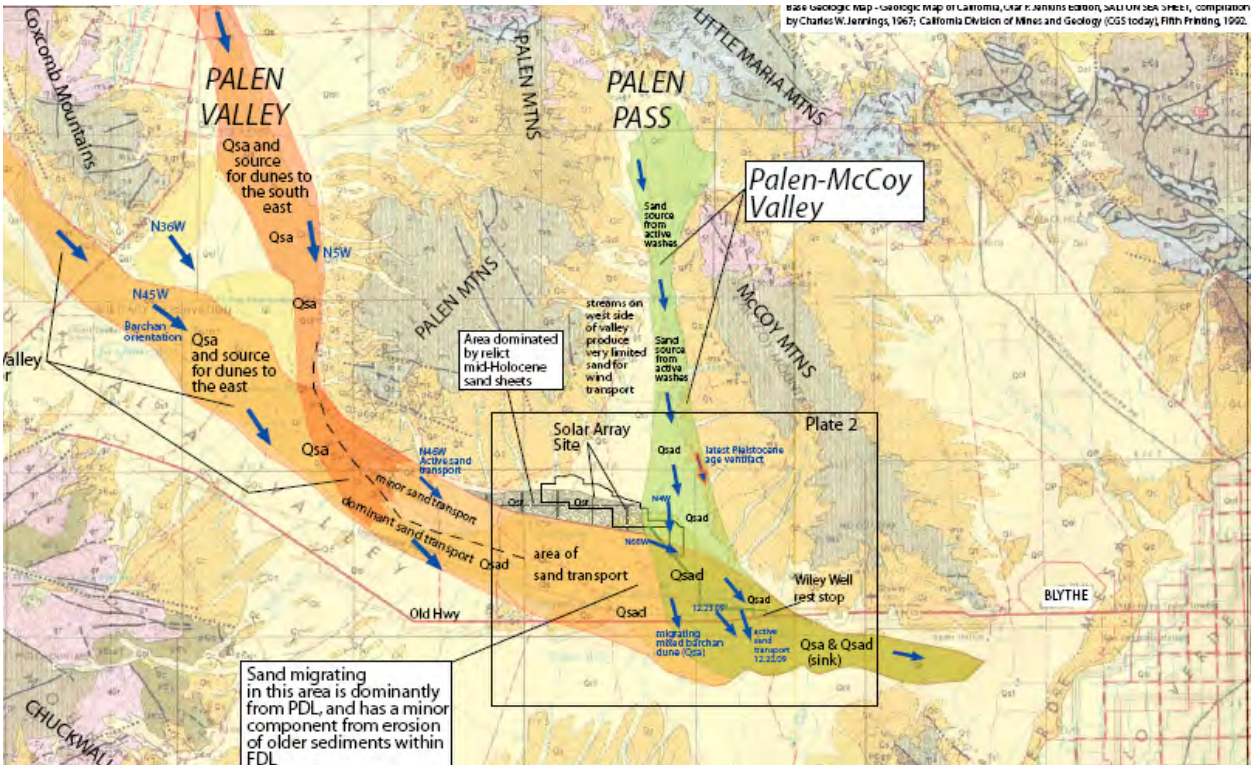


Figure 4. Generalized Sand Migration Corridors, Worley Parsons 2010.

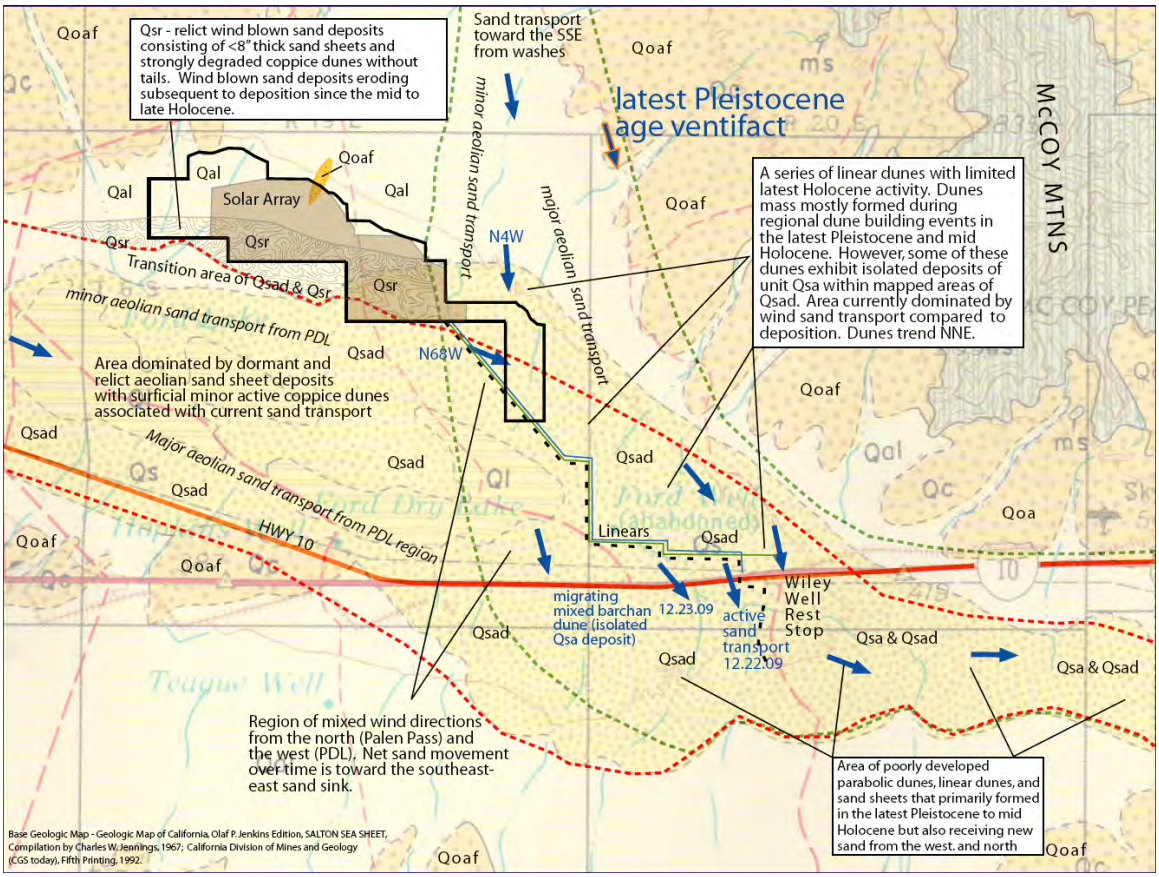


Figure 5. Detail of sand migration corridor and geological units around project site, Plate 2, Worley Parsons 2010.

Major Land Units

I visited as many of the main land types mapped by Worley Parsons as possible to assess their geomorphic condition and the accuracy with which they were delineated. These are described below. In each case I start with the description provided by Worley Parsons (in italics) and add my own comments and photos below (plain text).

<u>Qal Quaternary Alluvium</u>

Description (from Worley Parsons, 2010)

Quaternary Alluvium consisting of fluvial distal fan deposits. Within the site these deposits are composed of fine to very coarse sand and small gravel, well bedded and generally only 6-inches to 2-feet thick. Soil horizons indicate that the deposits are between 1ky to approximately 8 ky old.

These areas are found on the upper (north) area of the project site, and make up much of the footprint for the proposed western solar array. They cover some of the northern portion of the proposed eastern solar

array. The presence of coarse alluvial gravels with desert varnish (see figures 6 and 7) and established soil horizons is an indicator that this surface has been relatively stable for several thousand years. This is because desert varnish and soil horizons take thousands of years to develop, so that if the surface was subject to more frequent erosion or deposition these features would either be buried or eroded rather than found on the surface. This implies that sand deposition is not taking place, and that the fluvial channels found here are in equilibrium (pass the sediment they receive from upstream, but neither erode or deposit in significant amounts).

Figure 6. Alluvium surface. Person in photo is pointing into the northwest corner of the project site from the west.

Figure 7. Close up of alluvium surface showing lag (residual deposit) of coarse gravel overlaying sand, with desert varnish (black coloration of gravel).

Qsr Relict Sand Sheets and Dunes

Description (from Worley Parsons, 2010)

Area containing relict wind blown sand sheet and degrading coppice dune sediments with very limited to no active sand transport. These deposits are typically stabilized with grasses, creosote and wind generated very coarse sand to small gravel abrasion lag deposits. The youngest members of this unit exhibit near surface soil Bw soil horizons with an estimated minimum age of 1000 years.

Figure 8. Relict sand sheets and deflated vegetated dunes in the southern part of the project footprint.

This is the predominant land unit under the proposed eastern solar array, and along the southern edge of the western array. This surface is a transitional unit between the Qal and the Qsad, with thin sheets of sand and degraded vegetated dunes but little evidence of active sand transport or storage. As with the Qal this unit has soils that indicate relative stability over the order of thousands of years, but has not formed an alluvial lag surface. This unit provides little or no habitat for FTL.

Qsad Stabilized Dunes

Description (from Worley Parsons, 2010)

Area dominated by latest Pleistocene to late Holocene stabilized dunes but remain regions of current sand transport with isolated areas exhibiting wind blown sand deposition (sand sheets, coppice and avalanche face of linear dunes). Thus, many areas within mapped Qsad do not exhibit loose sand on the surface and fall under the definition of unit Qsr. Small isolated areas of mapped Qsad also fall under the definition of unit Qsa.

Figure 9. Vegetated sand dunes in the sand transportation corridor mostly south of the project footprint, with close up of ground surface.

This unit makes up the area south of the main project boundary. The southwest corner of the eastern solar array intrudes into this unit by about 1,500 – 2,000 feet. This unit appears suitable for FTL habitat, and has evidence of active wind transport of sand (for example 'plumper' vegetated dunes, coppice dunes indicating active sand movement, deeper sheets of sand with ripples). This area is part of the Chuckwalla Valley sand transport corridor.

Qsa Active Quaternary Sand Areas

Description (from Worley Parsons, 2010)

Areas of reasonable size to map that receive sufficient active wind blown sand migration to maintain dune system. Dunes within Qsa areas generally exhibit free avalanche faces and surficial loose sand. Qsa areas may exhibit active sand sheets (deposits from migrating ripples) and coppice dunes with tails (deposits associated with vegetation). Qsa areas are primarily located in Palen [Ford?] *Dry Lake and east of Wiley Well road. Limited areas of Qsa occur east of the Genesis Power site.*

Figure 10. Active sand dunes north of Wiley Wells Rest Stop. The laterals will pass through and alongside patches of similar conditions along their course.

Figure 11. Coppice dunes indicating active sand transport near Wiley Wells Rest Stop.

The Qsa formation is active sand associated with the Palen – McCoy Valley sand transport corridor and the large washes on the eastern side of the project. These routes deliver large quantities of sand to the east of the project area and supports active migrating sand dunes. The laterals will need to be designed to avoid blocking wind transport south through this unit, since blocking this corridor would .

Qoaf Fine Alluvial Deposits
Description (from Worley Parsons, 2010)
Latest Pleistocene distal fan deposits. They are composed silty fine to very coarse sand and minor small gravel. The unit is generally within 1 to 2 feet of the surface within the Project Solar Array site and exhibits a pedogenic soil horizon sequence that is likely a minimum of latest Pleistocene age.

Note – I did not visit any Qoaf sites in the field. It makes up a very small area in the north edge of the western solar array. It is possible that this unit supports FTL.

Drainage Features
Overlain on the major landscape units there are a series of drainage lines that cross the site from north to south. The vast majority of these are minor washes that appear to be distributary channels or that capture local flow in the fan surface. On my field visit I encountered only one well defined channel (west of the project footprint). It appears that there are much larger well defined channels that run east of the proposed eastern solar array and through the laterals corridor.

Minor Washes
More than a hundred minor washes cross the site from north to south. These channels are typically very subtle, with a width of 2-10 feet and a depth of 3-9 inches. They are found approximately every 100 feet when traversing along a contour on the mid fan surface. The presence of these channels in areas of desert varnish and soil horizons suggests that these channels are relatively stable (do not cut and fill vertically). It is likely that in the Qsr unit the channels avulse laterally across the surface without cutting vertically. The channels do not appear to transport much sediment, as evidenced by their shallow depth and the absence of scour features.

Figure 12. Typical minor ephemeral wash in the proposed western solar array.

Figure 13. Typical minor wash in the proposed western solar array.

Major ephemeral washes

Figure 14. Larger wash in western side of property showing west bank.

Figure 15. Larger wash with west bank out of shot on right, and east bank visible on upper left of photo.

A single larger wash was encountered that passes within the project boundary but west of the proposed western solar array. This was looked at as a potential reference condition for the washes that passes through the eastern side of the site, though these washes appear from aerial photos to be larger, and to carry more sand. The larger washes have braided channels that show more evidence of active sediment transport, with well defined banks and some sand in the channel bottom. Large washes visited elsewhere in the Chuckwalla Valley show evidence of wind-blown sand and vegetated sand dunes in a corridor around the channels, though this could not be confirmed in the Genesis project as the eastern washes were not visited.

Discussion of Mapping Accuracy and Interpretation

During the site visit I inspected most of the geologic units with Dr. Miles Kenney, who conducted the mapping and field investigation for Worley Parsons. I visited representative units of Qal and Qsr (which make up most of the proposed array footprints) and crossed the Qsad/Chuckwalla sand transport corridor from south to north in the western part of the project. I visited an area of Qsa at the south end of the laterals. I did not visit the western edge of the Palen-McCoy wind corridor and the large washes in this area. Defining the boundaries of the wind corridors is somewhat subjective since they do not have sharp edges and different researchers will likely place them in slightly different locations. The NECO land classification map provides a potential method of cross checking the boundaries, since it classifies areas of 'sand covered plains' and 'undifferentiated sand dunes' that tend to conform to wind transport corridors in other places where they have been mapped. The NECO classification (see Figure 16) is very similar to the Worley Parsons classification for the northern edge of the Chuckwalla corridor within the project area, with the NECO classification placing the corridor approximately 500 feet further within the project footprint. Given the subtleties of the boundary this difference is very minor. The NECO classification for the western edge of the Palen-McCoy corridor places it further east than Worley Parsons, reducing the area within the project footprint.

Based on the field visit, review of the applicant's reports, review of aerial photos and of the NECO classification I found the applicant's classification and interpretation to be reasonable and was satisfied with the evidence used to indicate the location and geomorphic stability of the different units. My only area of potential disagreement is over the importance of the large wash that crosses the project in the eastern array (discussed under the impacts section).

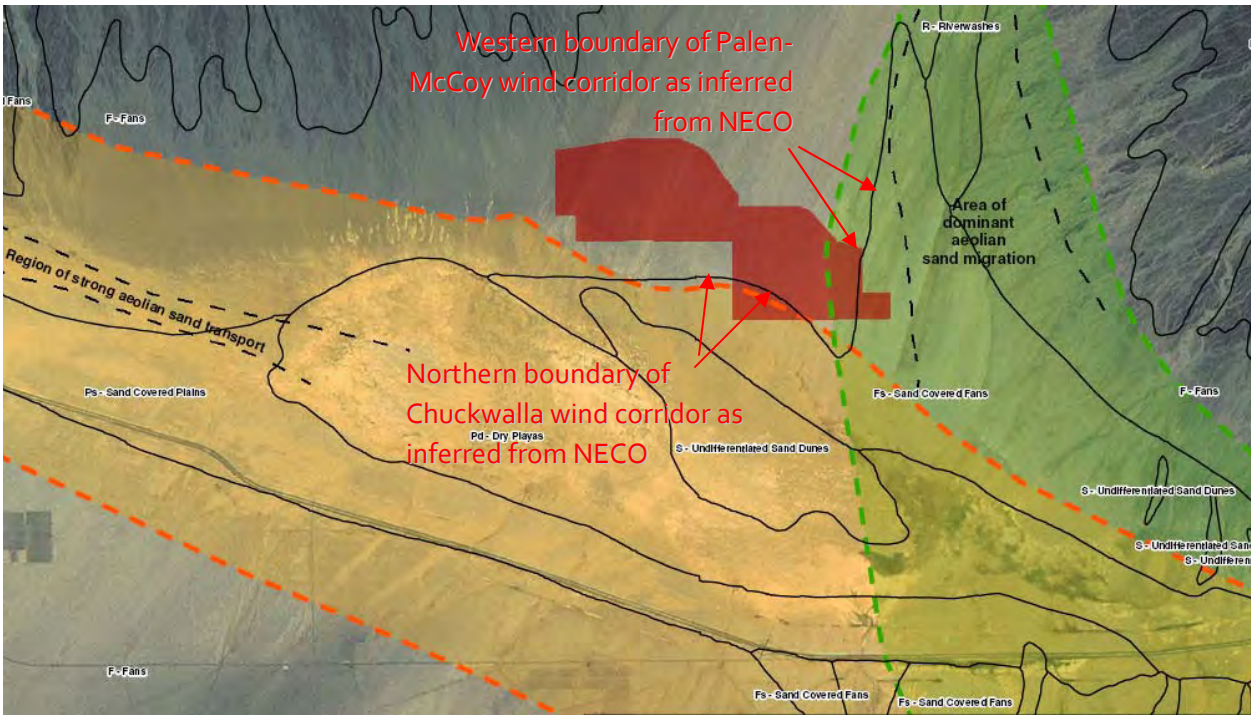


Figure 16. Detail of NECO land classifications superimposed over Worley Parsons mapping (Sources: Helix, 2010 and Plate 5, Worley Parsons, 2010). Note black comments and all dashed lines are from Worley Parsons, black text with white shadow and black line boundaries are from NECO classification, and red text and red arrows are from PWA.

Potential Project Impacts

Impacts to the Qal

The Qal is a relatively stable surface, with little evidence of active sand transport. The presence of the gravel with desert pavement and varnish is evidence that this surface is also stable from a fluvial perspective (i.e. that the small channels, while potentially prone to lateral migration and avulsion across the stable surface, do not tend to cut vertically into the surface. From a geomorphic perspective construction of the project on the Qal area should have relatively little off site impact. Because there is little sediment transport occurring on this surface construction of the proposed project does not appear likely to disrupt the movement of sediment to habitat areas elsewhere.

Potential Avoidance and Mitigation of Impacts to the Qal Area

None proposed on geomorphic grounds.

Impacts to the Qsr

The Qsr is a relatively stable surface, with little evidence of active sand transport. The presence of the soil horizons is evidence that this surface is also stable from a fluvial perspective (i.e. that the small channels, while laterally active, do not tend to downcut or fill vertically). From a geomorphic perspective construction of the project on the Qal area should have relatively little off site impact. Because there is little sediment transport occurring on this surface construction of the proposed project does not appear likely to disrupt the movement of sediment to habitat areas elsewhere.

Potential Avoidance and Mitigation of Impacts to the Qsr Area

None proposed on geomorphic grounds.

Impacts to the Qsad/Chuckwalla Wind Transport Corridor

The western array avoids the Chuckwalla sand transport corridor as mapped by both Worley Parsons and NECO. The eastern array intrudes into the corridor by approximately 1,600 feet at a point where the corridor is 24,000 feet wide based on Worley Parsons. This intrusion represents about 7% of the Chuckwalla sand corridor width. Using the NECO classification the intrusion is 12% (largely due to NECO mapping the corridor as thinner than Worley Parsons rather than big differences in the boundary at the project site). The part of the corridor that is impacted does not appear to be the most active with regard to sediment transport rates based on the amount of sand in storage on the ground, evidence for sand transport from ripples and coppice dunes etc. Conservatively assuming that sediment transport rates in the area impacted are half those in the central corridor, and taking the more conservative NECO corridor classification, the reduction in sediment transport capacity is less than 6%, and likely lower. This does not represent a significant impact on sediment transport processes for the corridor as a whole, though

it does present a moderate off-site impact immediately downwind of the project site. Based on the degree of intrusion into the corridor and the length of the intrusion I estimated an area of 157 acres of sand covered plains (Qsad) that would be impacted. This area is expected to experience deflation of existing sand areas and armoring of substrate (see Figure 17).

Potential Avoidance and Mitigation of Impacts to the Qsad/Chuckwalla Wind Transport Corridor

It is recommended that the project minimize encroachment of the main footprint into the Qsad/sand transport corridor. Mitigation to compensate for 157 acres of vegetated sand dune is proposed for the current project footprint.

Impacts to the Palen-McCoy Wind Transport Corridor

Based on the applicant's report the eastern solar array intrudes into the Palen-McCoy corridor by approximately 2,800 feet at a point where the corridor is 15,000 feet wide (cutting off 19% of the corridor). Based on the NECO mapping the intrusion is smaller (1,700 feet) but the undisturbed corridor is also narrower (8,300 feet), also resulting in a 20% reduction in width. Although the project cuts off a large area of sand corridor, there is good evidence to suggest that most sand transport takes place east of this zone (outside the project footprint, though within the area crossed by the laterals). Plates 14 and 15 of the Worley Parsons report show field conditions in the impacted area (Plate 14) and further east (Plate 15), providing evidence of much greater rates of sand transport to the east of the project footprint. In the absence of quantitative data and conservatively assuming that the rate of sediment transport is half as much in the outer corridor as it is in the inner corridor the intrusion probably represents less than a 10% reduction in sand transport. Based on the photos it is feasible that the true rate of sediment transport in the impacted area may be significantly less than this. However, although the magnitude of impact to the entire wind transport corridor is relatively low, the area of off-site impacts immediately downwind of the project is large: the lee area downwind of the project that is likely to experience sand depletion is 309 acres (see Figure 17). Since there is 13 acres of overlap from both wind shadows the combined area impacted by intrusions into both corridors is 453 acres. This area would be expected to experience deflation (loss of sand from the existing vegetated dunes over time) and armoring (coarsening of the sand and gravel as fine sand is eroded by the wind).

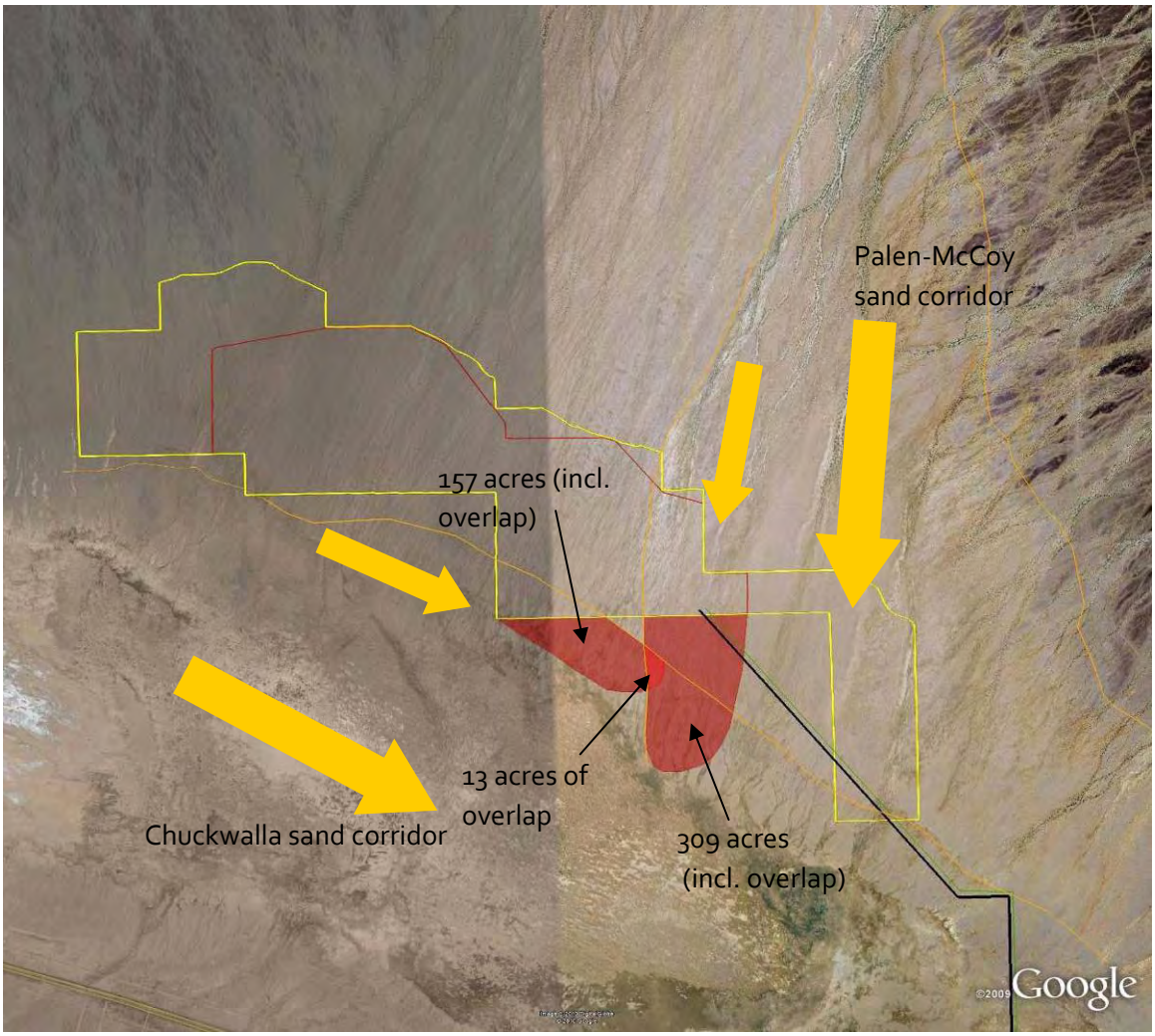


Figure 17. Zones of moderate impact to the wind transport corridor and vegetated sand dunes from encroachment of the project into the Chuckwalla and Palen-McCoy sand corridors. Major wind transport zones shown with large gold arrows, less significant wind transport zones shown with small gold arrows.

Impacts to the Qsa

The Qsa is the active area of sand dunes supplied by wind and water transport from the Palen – McCoy Valley sand corridor. This corridor supplies biologically-significant sand dune habitat downwind, and preserving sand transport is important. This area is crossed by the laterals near Wiley Wells Rest Stop.

Potential Avoidance and Mitigation of Impacts to the Qsa Area

The main project footprint should avoid this area completely since large scale obstruction of this unit would be hard or impossible to mitigate for. The project should be able to avoid or minimize

impacts created by the laterals within this zone by avoiding creating barriers to wind and water transport. Most wind-borne transport of sand occurs within 3 feet of the ground, so infrastructure should be constructed flush with the surrounding ground surface and without ground level obstructions. Power pylons should not pose a significant problem due to their small surface area at ground level. Water and gas pipelines should be buried below ground. Road surfaces should be flush with the ground surface. There should not be drainage ditches running perpendicular to the wind direction (approximately north-south in the northern section of the lateral route, shifting to west-east in the southern area). Wind fences should not be permanently erected in the lateral area. It is understood that temporary wind fences are proposed for during construction, but not permanently. The duration that wind fences are used for should be kept to the minimum, since downwind impacts may be felt within 1-2 years.

Drainage Plan

The drainage plan for Genesis involves constructing an interceptor channel around the north project boundary, collecting flows in constructed channels and passing them around the project for discharge onto the alluvial fan downslope. In order to assess whether such a plan is likely to cause impacts I visited I10 to look at a drainage that passes through the freeway and back on to the alluvial fan surface 12 miles west of Genesis. The pattern of major and minor washes may be an analogue for conditions following construction of a solar array and drainage plan at Genesis.

<u>I10 as a Reference Site for the Genesis Drainage Plan</u>

Numerous small ephemeral channels heading towards I10 have been intercepted and concentrated into two drainage channels. The westerly channel intercepts a 1.6 mile width of upper alluvial fan, and the easterly channel intercepts 1.9 miles of fan. The flow is collected into a single engineered earth channel then passed under I10 in a concrete trapezoidal channel and discharged back onto the fan surface downslope without any dissipation. The applicant for Genesis proposes an interceptor channel that collects flow from the ephemeral washes, routes it around the solar arrays, and discharges flow back onto the fan below, but with a more controlled treatment of flows at the discharge point consisting of a series of structures designed to spread flow out in small volumes across a wide fan area. Thus I10 might be viewed as a ‘worst case’ scenario for release of concentrated flows. Offsetting this, the discharge point on I10 is in coarse alluvial gravels, which have mitigated some of the impacts of uncontrolled flow.

I visited the easterly collector channel and walked it for a distance of 1,000 feet onto the mid fan surface. The collector channel that ran parallel with I10, though artificial, had a somewhat natural appearance and function (earth banks and bed, apparently stable, no excessive erosion or deposition, some typical wash vegetation present in the channel). The wash formed a slightly incised single channel immediately downstream of I10 where it passed from the concrete channel onto the mid fan (vertical banks

approximately 4 feet high, with a width of 50 feet). However, incision ceased within a few hundred feet of I10 and the channel widened and formed braids. The channel showed evidence of higher energy flows in the presence of scour features and very coarse bed material (coarse gravel and cobble sized sediment). However, the gravel and cobble bed appeared to be a natural armor layer that formed from selective scour of the finer sand, forming a protective layer. Within a few hundred feet of I10 the wash supported typical large wash morphology and vegetation, and appeared to be depositing the sand eroded upstream along its margins, creating good quality sandy habitat.

Figure 18. Interceptor channel running parallel with I10 (flow towards viewer)

Figure 19. Close up of vegetation in the constructed interceptor channel

Figure 20. Interceptor channel passes under I10 (flow away from viewer)

Figure 21. Incised and scoured channel immediately downstream of I10. Bank detail shown in next photo.

Figure 22. Channel bank is 4 feet high. Gravel in the fan provides armor that stabilizes the channel.

Figure 23. Channel widens and becomes less incised 300 feet downstream of I10

Figure 24. Channel widens and becomes less incised 800 feet downstream of I10

Based on this reconnaissance-level assessment it seems likely that it would be feasible to capture the minor washes at the Genesis project boundary, concentrate them in earth-lined channels and dissipate them back on to the fan surface downstream provided that:

- The watershed area of the captured channels is similar to that of the reference reaches assessed
- The fan gradient at the discharge point is similar or less
- The sediment at discharge point has some coarse gravel and cobble to form an armor (or this is imported for a few hundred feet)

The first two assumptions are likely to be correct, though the third assumption is likely not since sediment tends to be finer downfan and the proposed discharge locations may be more prone to scour than the area near I10. If this is the case cobble and gravel would need to be added to provide an armor layer.

Assuming these conditions to be the case it appears that it is feasible to bring water around the Genesis site in relatively natural channels that may provide habitat and migration value. It also appears likely that water may be discharged back on to the fan surface with minimal impact, provided that there is a cobble supply to armor the first few hundred feet of discharge. There is potential to develop the drainage channels using more natural channel morphology than currently proposed, to provide biological functions and act as wildlife corridors.

Discussion of Project Alternatives

The Reduced Acreage Alternative (shown in Figure 25) was assessed for its potential geomorphic impacts. The alternative removes the proposed eastern solar array from the project. Since the main geomorphic impacts identified in this report are associated with the eastern solar array this alternative would have lower impacts, with no impact on the Chuckwalla and Palen-McCoy sand corridors or on the eastern wash complex.

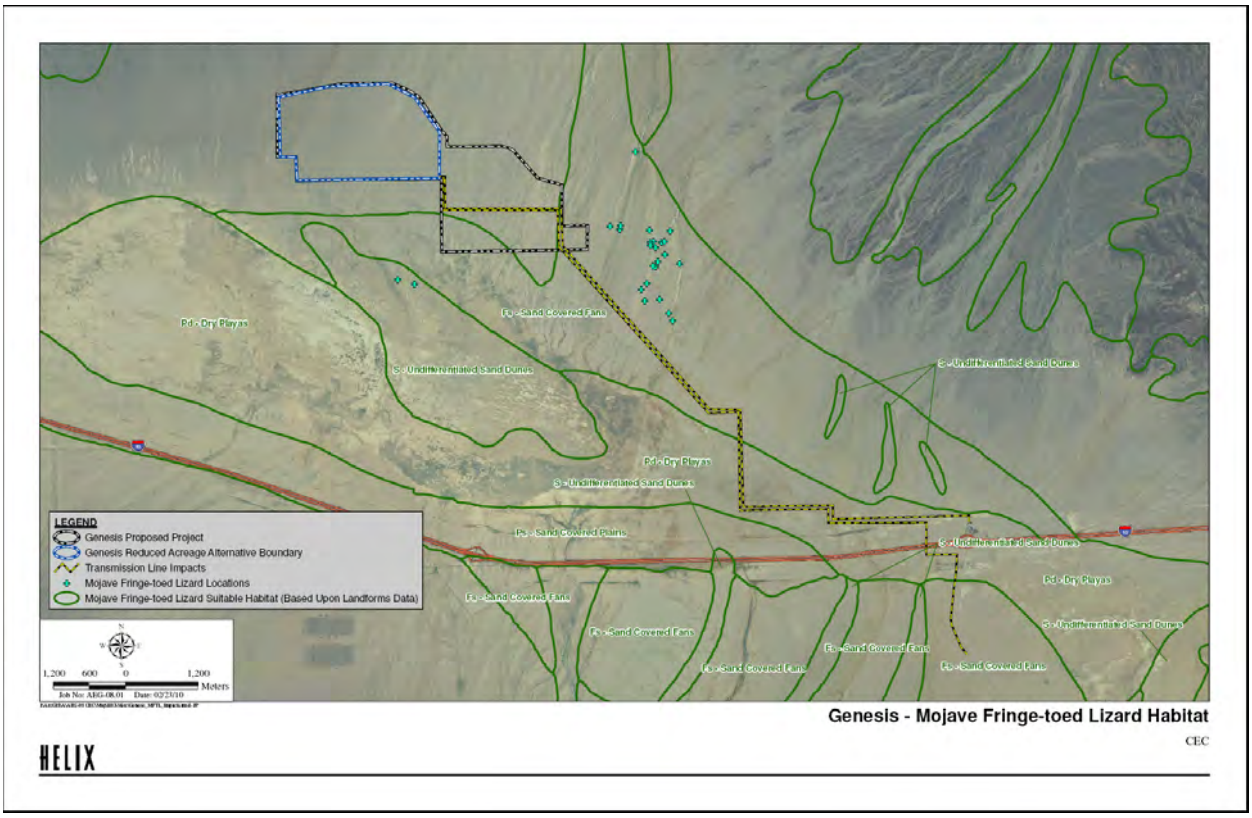


Figure 25. Reduced acreage alternative (source: Helix, 2010)

References

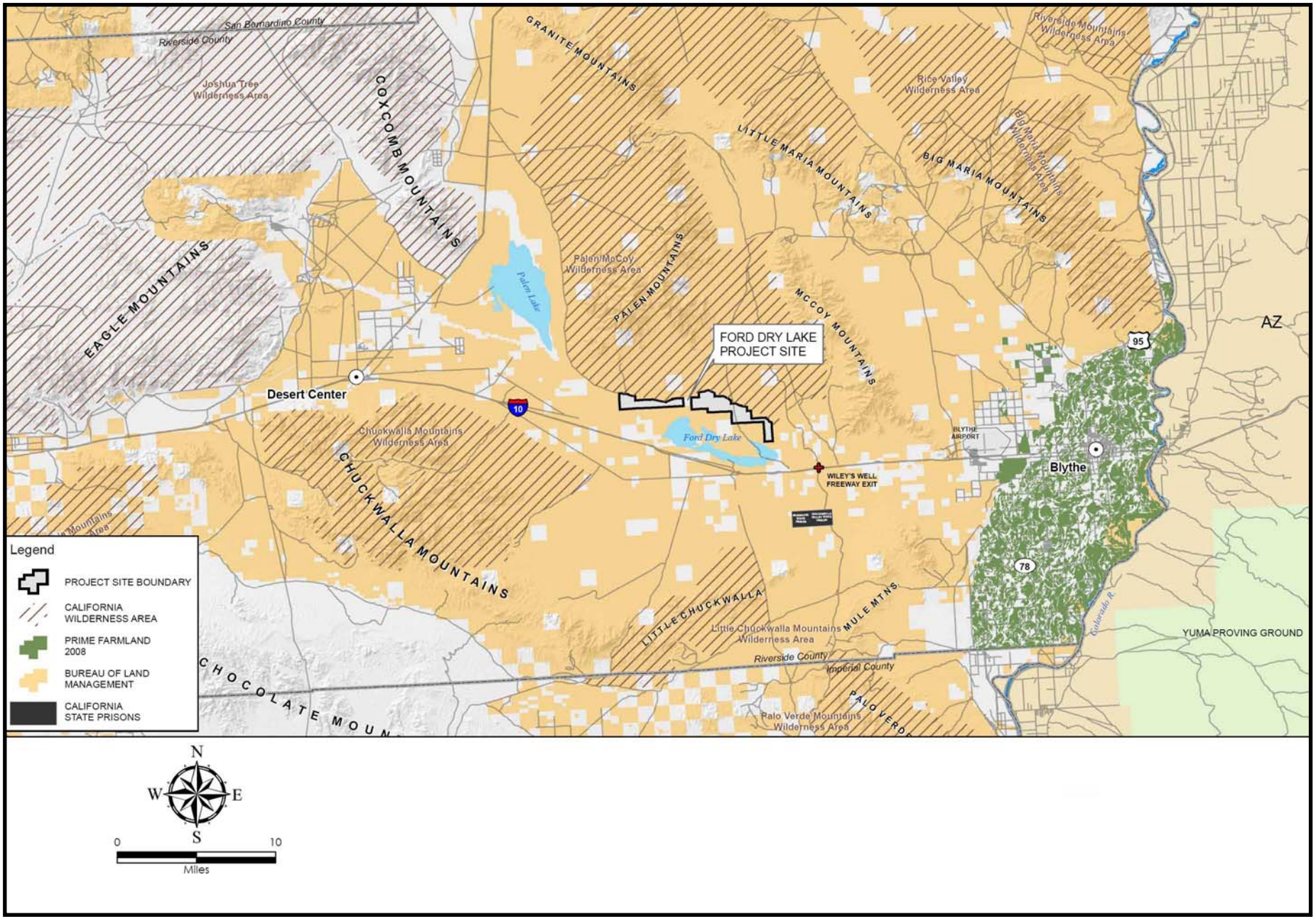
Bureau of Land Management California Desert District and California Department of Fish and Game Inland, Desert, and Eastern Sierra Region. *Proposed Northern and Eastern Colorado Desert Coordinated Management Plan and Final EIS*, July 2002.

Turner, F.B., Weaver, D.C. and Rorabaugh, J.C. Effects of reduction in windblown sand on the abundance of the Fringe_toed Lizard (*Uma inornata*) in the Coachella Valley, California. Copeia, 1984(2), pp. 370-378.

Worley Parsons. Aeolian transport evaluation and ancient shoreline delineation report, Genesis solar energy project, Riverside County, CA. February 5th 2010.

SOIL AND WATER - FIGURE 1

Genesis Solar Energy Project - Project Location Map

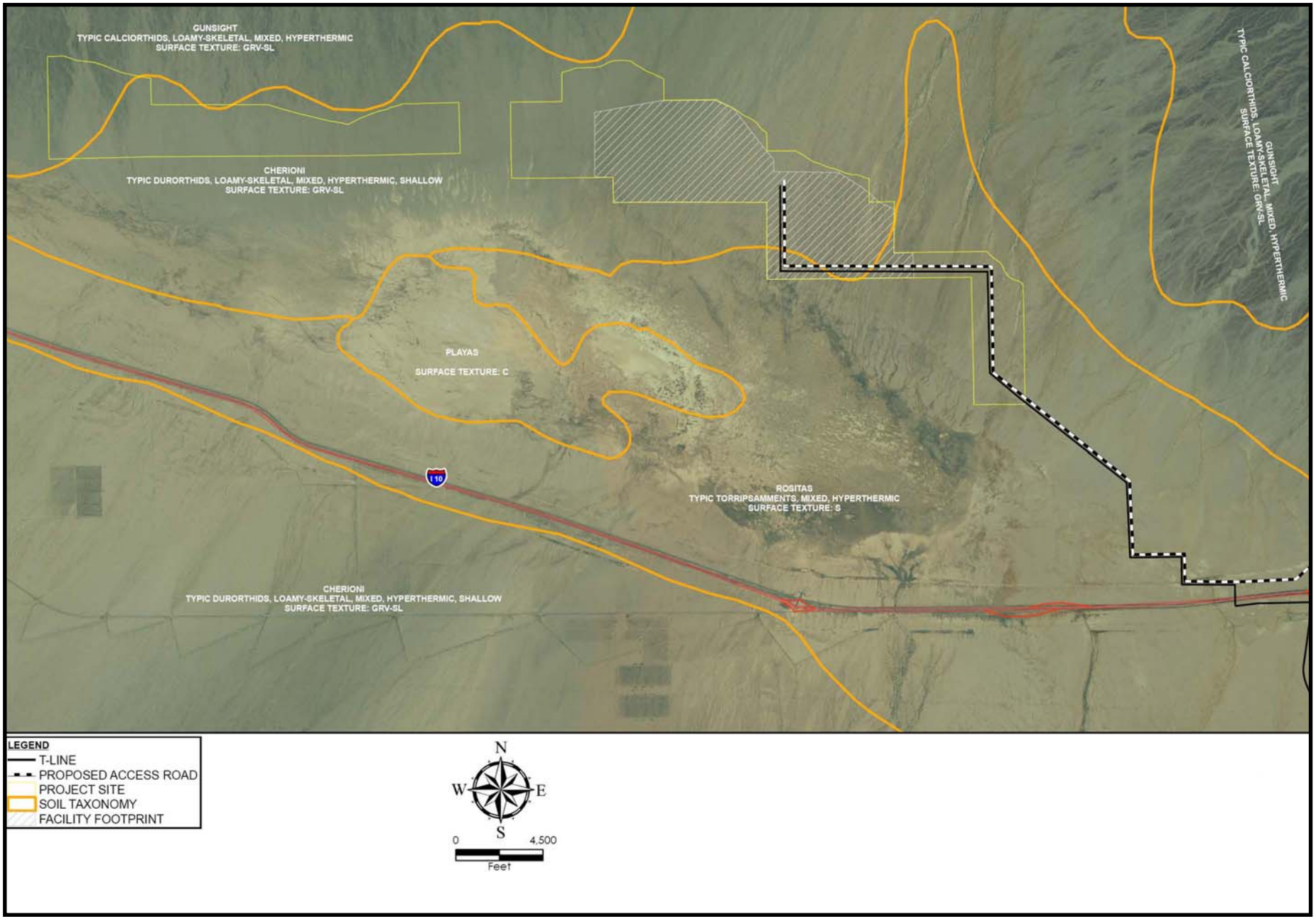


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 2

Genesis Solar Energy Project - Soils Map

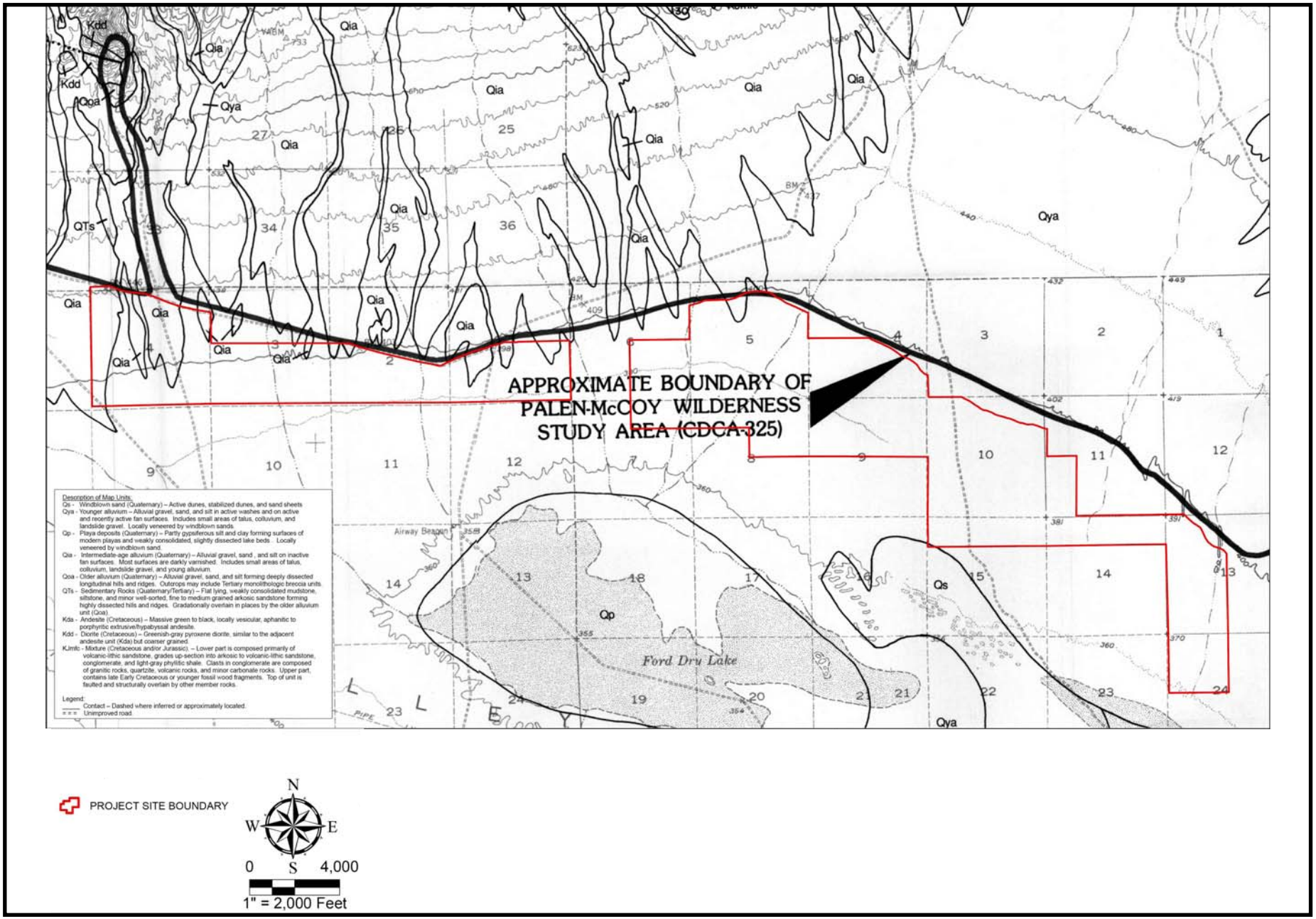


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009a

SOIL AND WATER - FIGURE 3

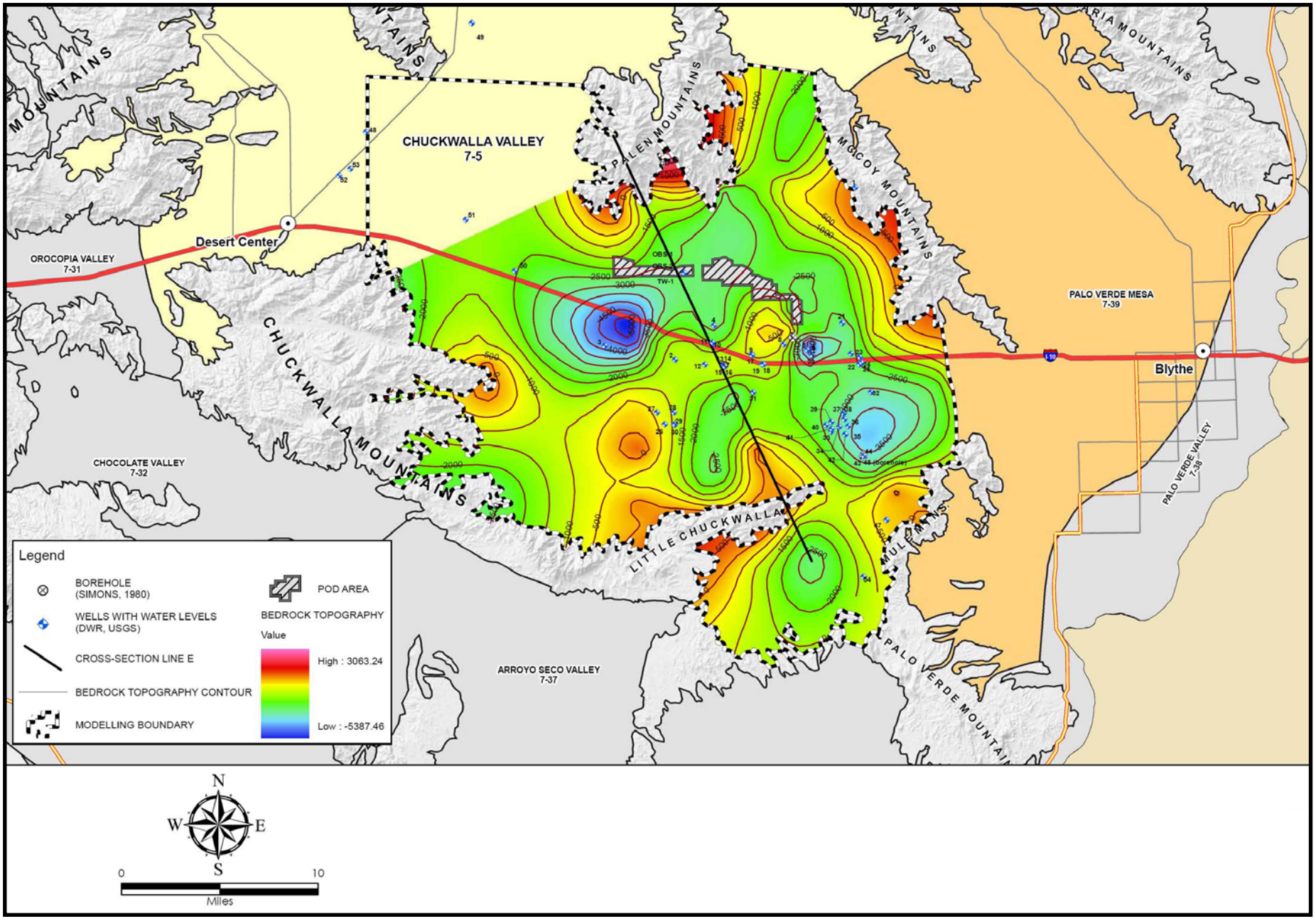
Genesis Solar Energy Project - Regional Geologic Map



SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 4

Genesis Solar Energy Project - Chuckwalla Valley Groundwater Basin Bedrock Topography Map - Ford Dry Lake Area

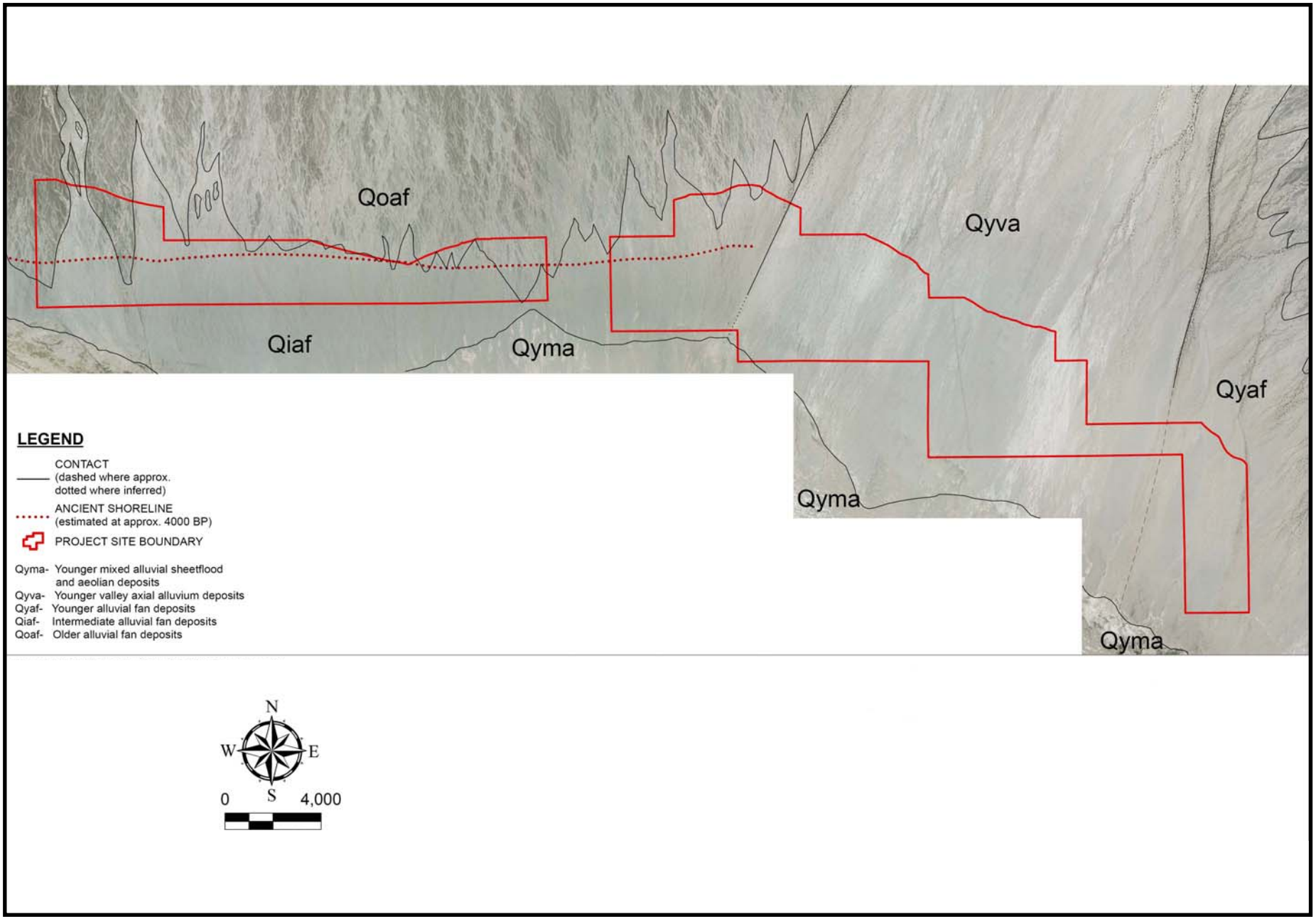


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 5

Genesis Solar Energy Project - Local Geologic Map



SOURCE: GSEP 2009a

SOIL AND WATER - FIGURE 6

Genesis Solar Energy Project - Generalized Local Sand Migration Corridors and Depositional Areas

SYMBOL DESCRIPTIONS

Qal — Quaternary Alluvium consisting of fluvial distal fan deposits. Within the site these deposits are composed of fine to very coarse sand and small gravel, well bedded and generally only 6-inches to 2-feet thick. Soil horizons indicate that the deposists are between 1ky to approximately 8 ky old.

Qsa — Areas of reasonable size to map that receive sufficient active wind blown sand migration to maintain dune system. Dunes within Qsa areas generally exhibit free avalanche faces and surficial loose sand. Qsa areas may exhibit active sand sheets (deposits from migrating ripples) and coppice dunes with tails (deposits associated with vegetation). Qsa areas are primarily located in Palen Dry Lake and east of Wiley Well road. Limited areas of Qsa occur east of the Genesis Power site.

Qsad — Area dominated by latest Pleistocene to late Holocene stabilized dunes but remain regions of current sand transport with isolated areas exhibiting wind blown sand deposition (sand sheets, coppice and avalanche face of linear dunes). Thus, many areas within mapped Qsad do not exhibit loose sand on the surface and fall under the definition of unit Qsr. Small isolated areas of mapped Qsad also fall under the definition of unit Qsa.

Qsr — Area containing relict wind blown sand sheet and degrading coppice dune sediments with very limited to no active sand transport. These deposits are typically stabilized with grasses, creosote and wind generated very coarse sand to small gravel abrasion lag deposits. The youngest members of this unit exhibit near surface soil Bw soil horizons with an estimated minimum age of 1000 years.

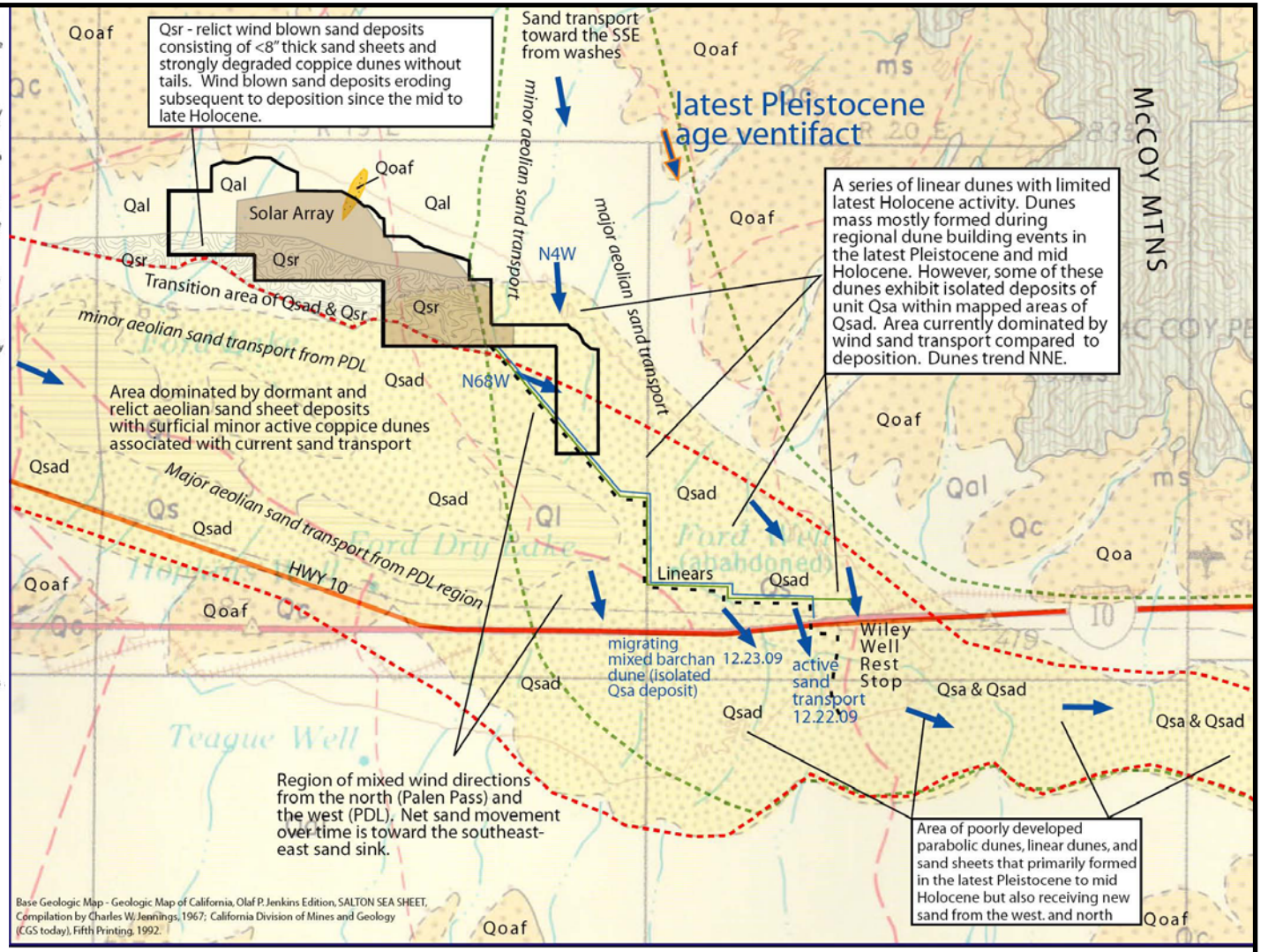
Qoaf — Latest Pleistocene Alluvial fan deposits. They are composed silty fine to very coarse sand and minor small gravel. The unit is generally within 1 to 2 feet of the surface within the Project Solar Array site and exhibits a pedogenic soil horizon sequence that is likely a minimum of latest Pleistocene age.

Note: Mapping current active areas of wind blown sand deposits in the Ford Dry Lake region is problematical. This is because the region of the Chuckwalla Valley during the latest Holocene has experienced a greatly reduced rate of wind blown sand migration and deposition compared to periods during the latest Pleistocene to late Holocene. Thus many areas contain near surface sand deposits of latest Pleistocene to late Holocene age that are currently stabilized with vegetation and wind blown lag deposits. Most current active areas of wind blown sand transport continue to occur in the same regions since the latest Pleistocene but sand supply is only sufficient to produce limited areas of active wind blown sand deposition within these areas (Qsad). Sand transport and migration terms Qsa, Qsad, and Qsr attempt to discern relative magnitudes of the wind blown sand input and deposition. Qsa depicts areas of reasonable size to map that receive sufficient sand input to maintain an active dune field. Qsad represents an region that is dominated by older stabilized dunes but is within a wind blown sand migration corridor to maintain limited areas of surficial active wind blown sand deposition (thin sand sheets, coppice dunes, and linear dunes). Qsr depicts regions that were once an area of wind blown sand migration and relatively minor deposition during the latest Pleistocene to late Holocene, but are dominantly no longer receiving sufficent wind blown sand to result in sand deposition.

N20W — Wind direction vector measured in the field. Directions based on coppice tails (graded scale of 1 to 10 years), barchan and Linear dunes (cyclic scale - thousands of years), and ventifacts in rocks on late Pleistocene surfaces. Note, vector directions were not obtained from instantaneously forming ripple directions, however, active ripples were very generally very consistent with older wind direction indicators. Orientation indicates direction the wind is from.

Approximate limits of aeolian sand migration corridor from Palen Dry Lake (PDL) region toward the east along the Chuckwalla Valley (PDL-Chuckwallay Valley).

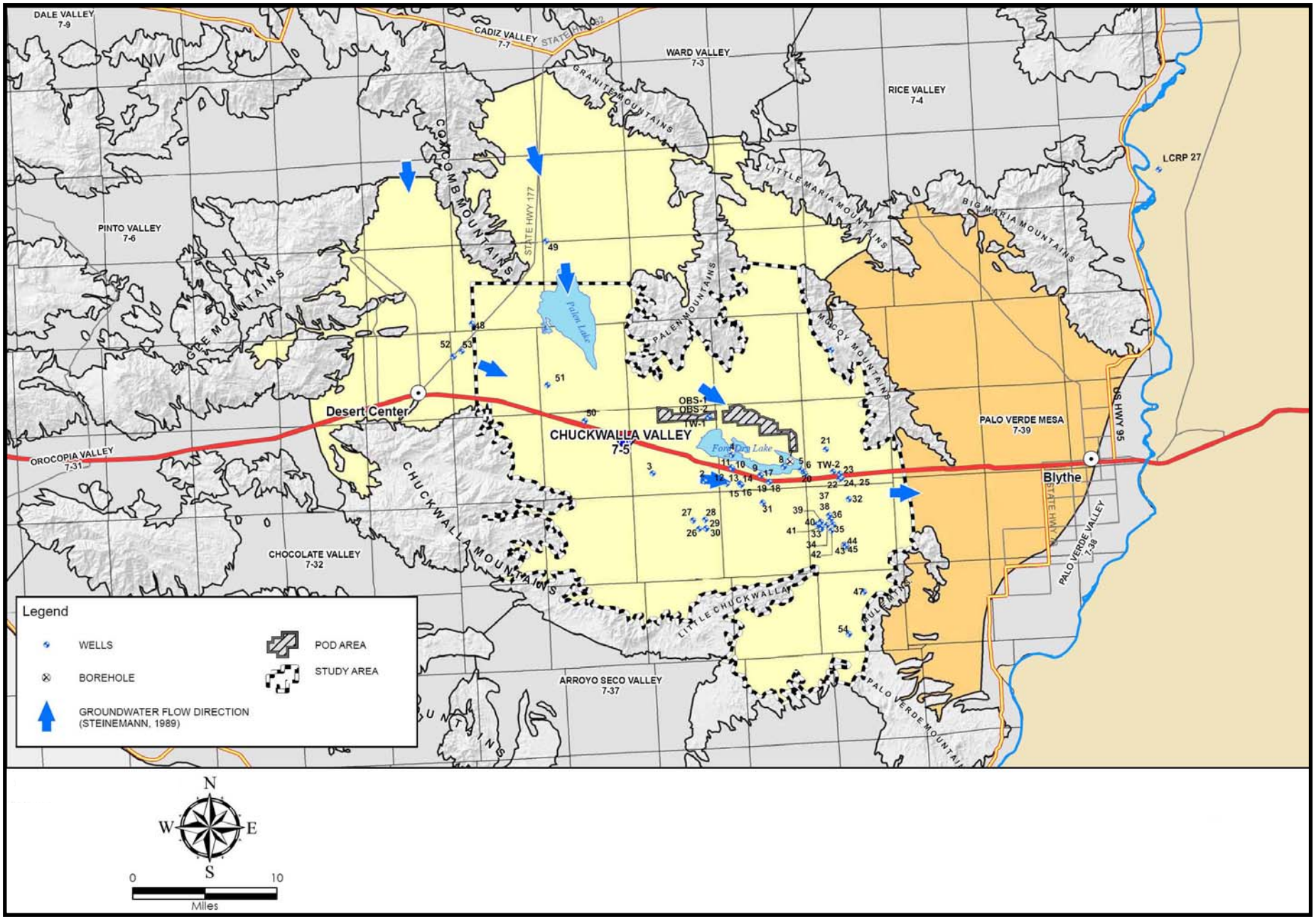
Approximet limts of aeolian sand migration corridor from Palen Pass toward the south between the Palen and McCoy Mountains. (Palen-McCoy Valley)



SOURCE: WPAR, 2010

SOIL AND WATER - FIGURE 7

Genesis Solar Energy Project - Hydrogeologic Setting

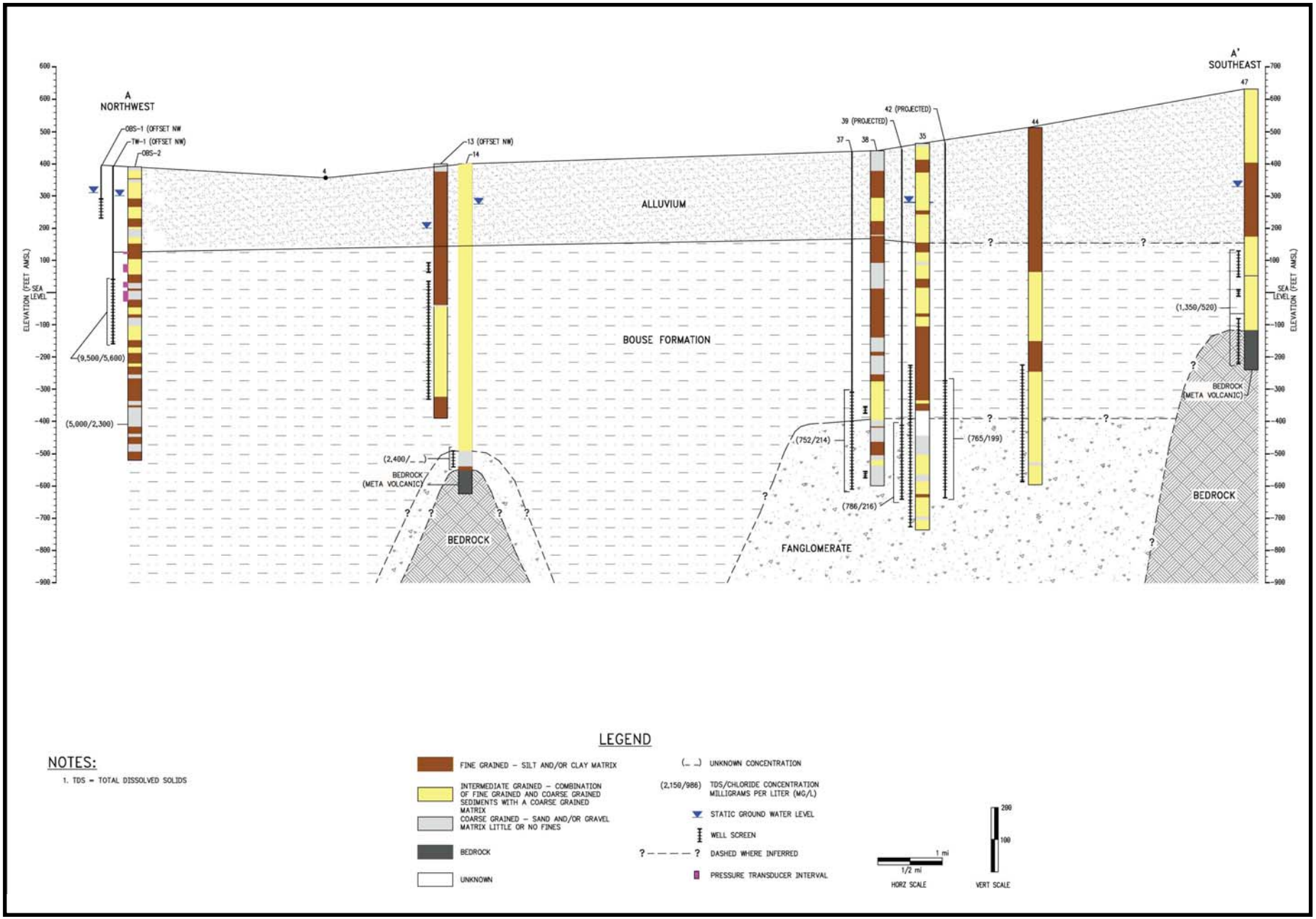


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 8

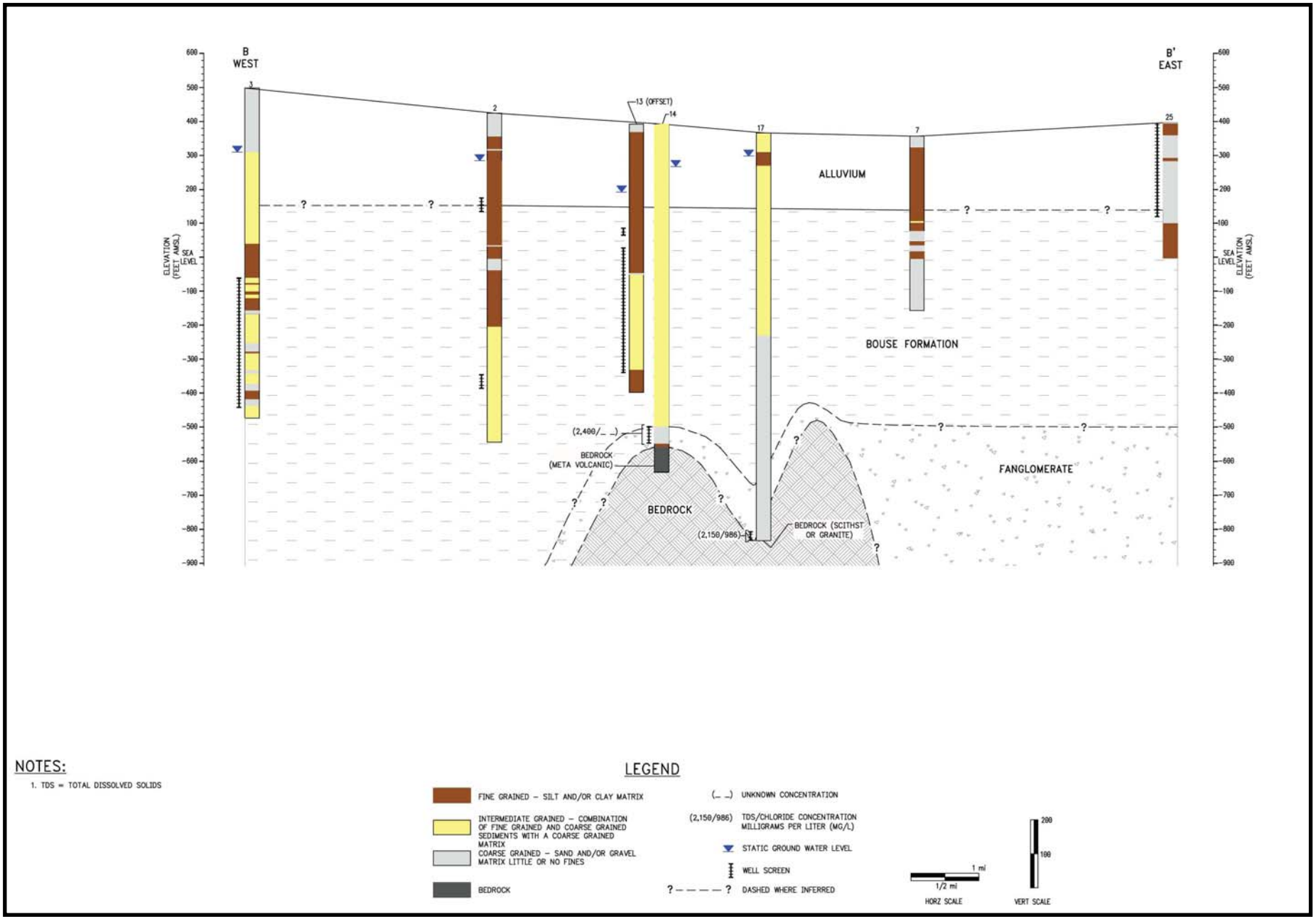
Genesis Solar Energy Project - Hydrostratigraphic Cross-Section A-A'



SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 9

Genesis Solar Energy Project - Hydrostratigraphic Cross-Section B-B'

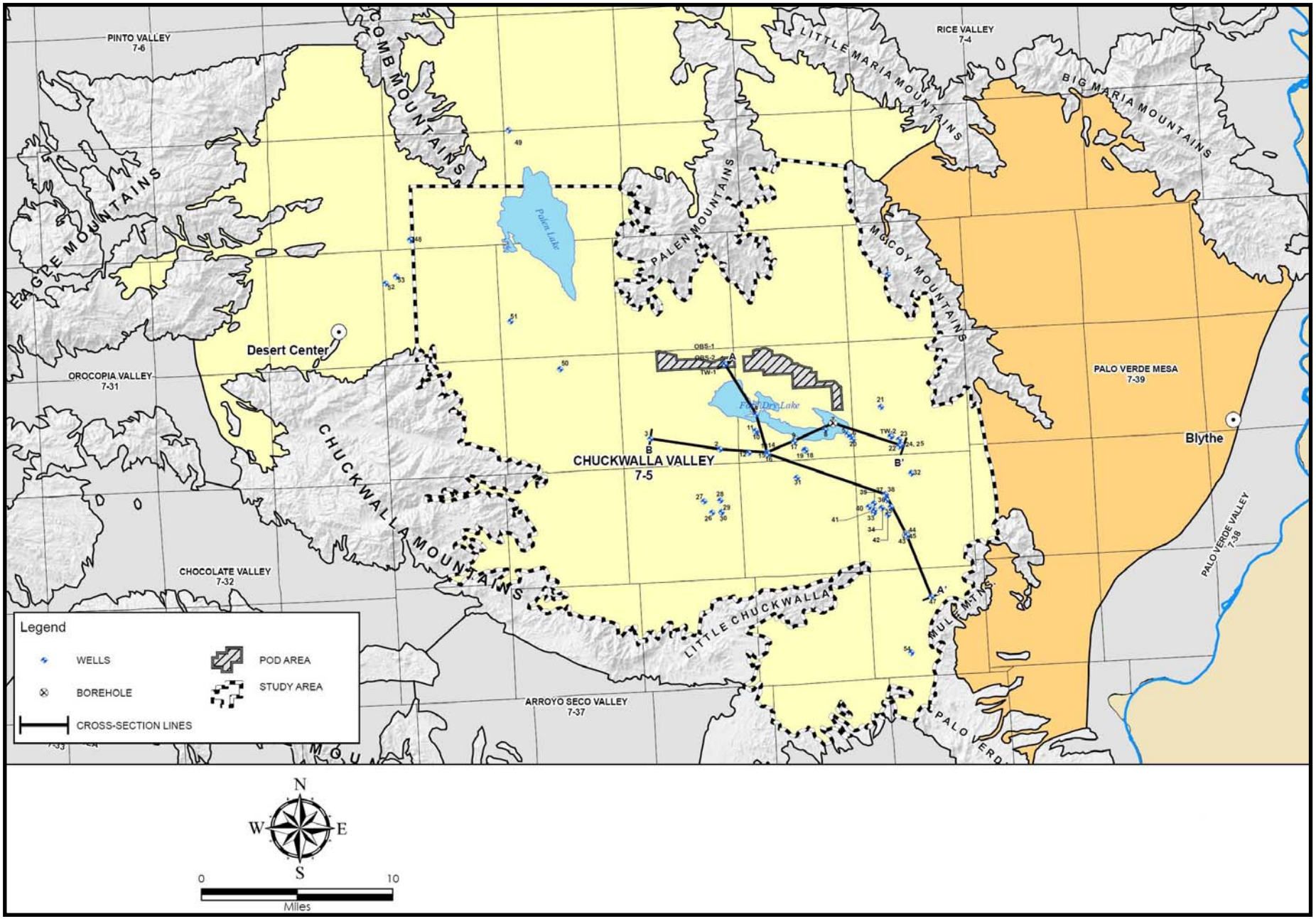


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 10

Genesis Solar Energy Project - Hydrostratigraphic Cross-Section Lines

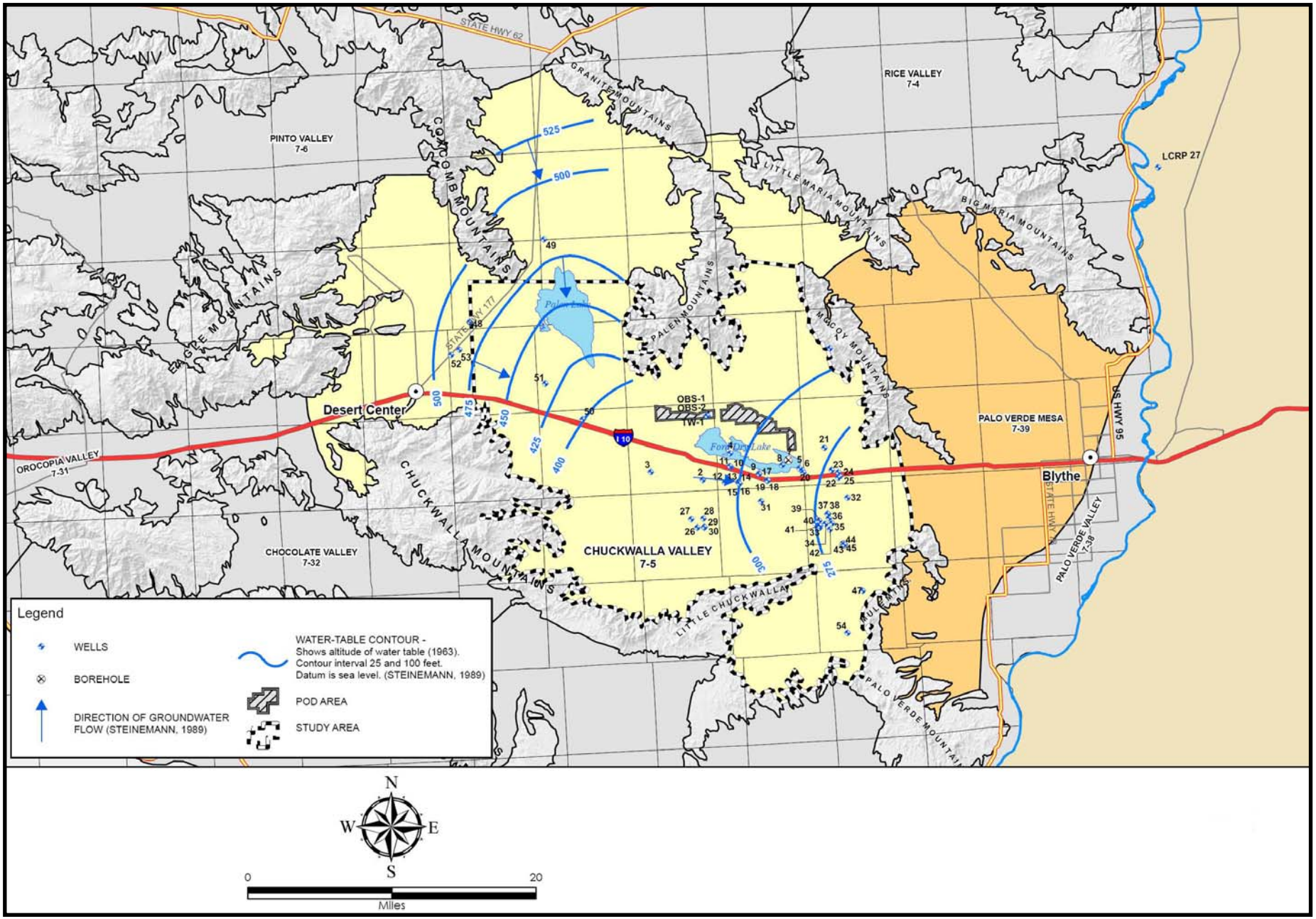


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 11

Genesis Solar Energy Project - Groundwater Level Contour Map (1963)

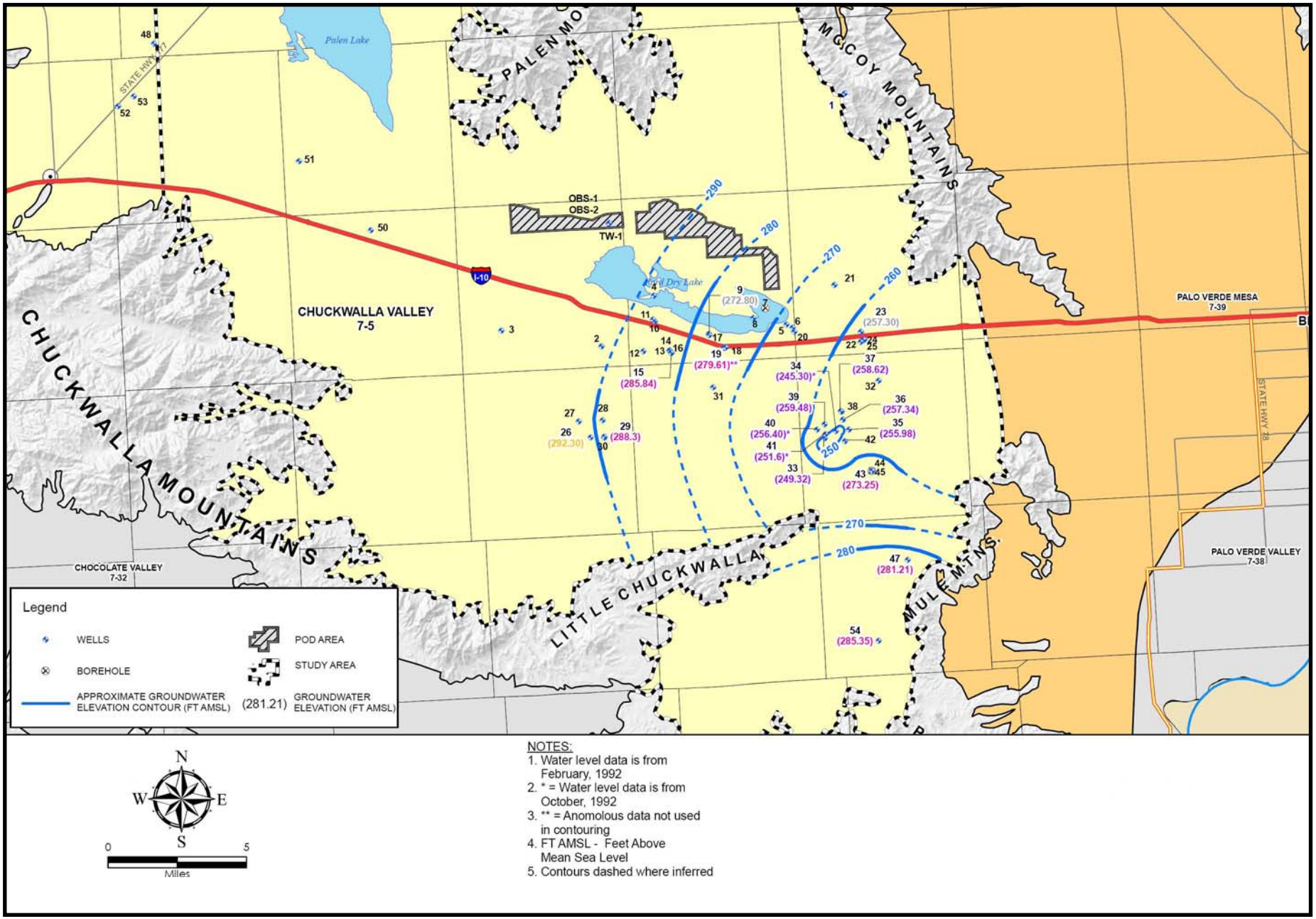


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 12

Genesis Solar Energy Project - Groundwater Level Contour Map (1992)

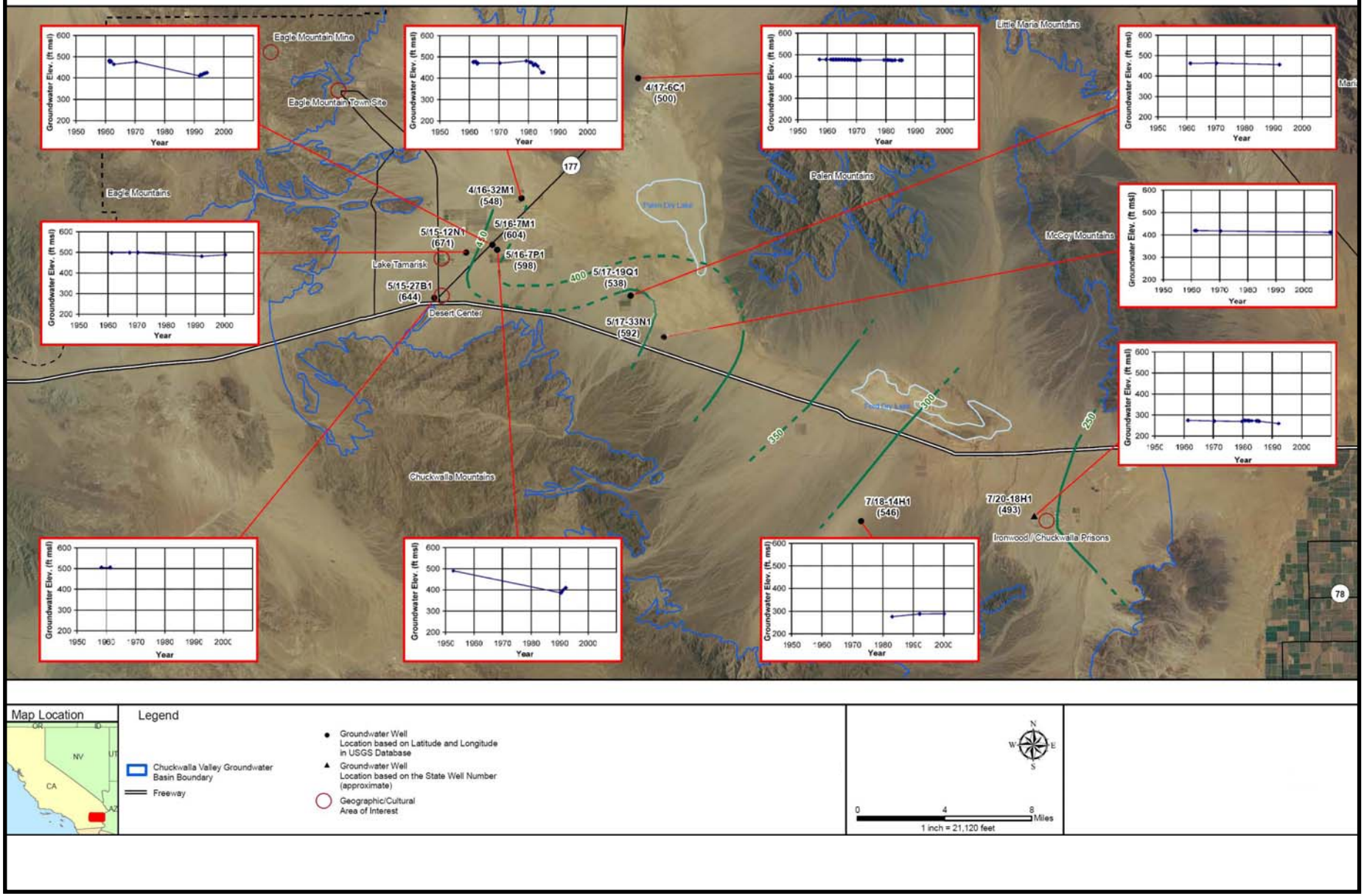


NOTES:
1. Water level data is from February, 1992
2. * = Water level data is from October, 1992
3. ** = Anomolous data not used in contouring
4. FT AMSL - Feet Above Mean Sea Level
5. Contours dashed where inferred

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 13

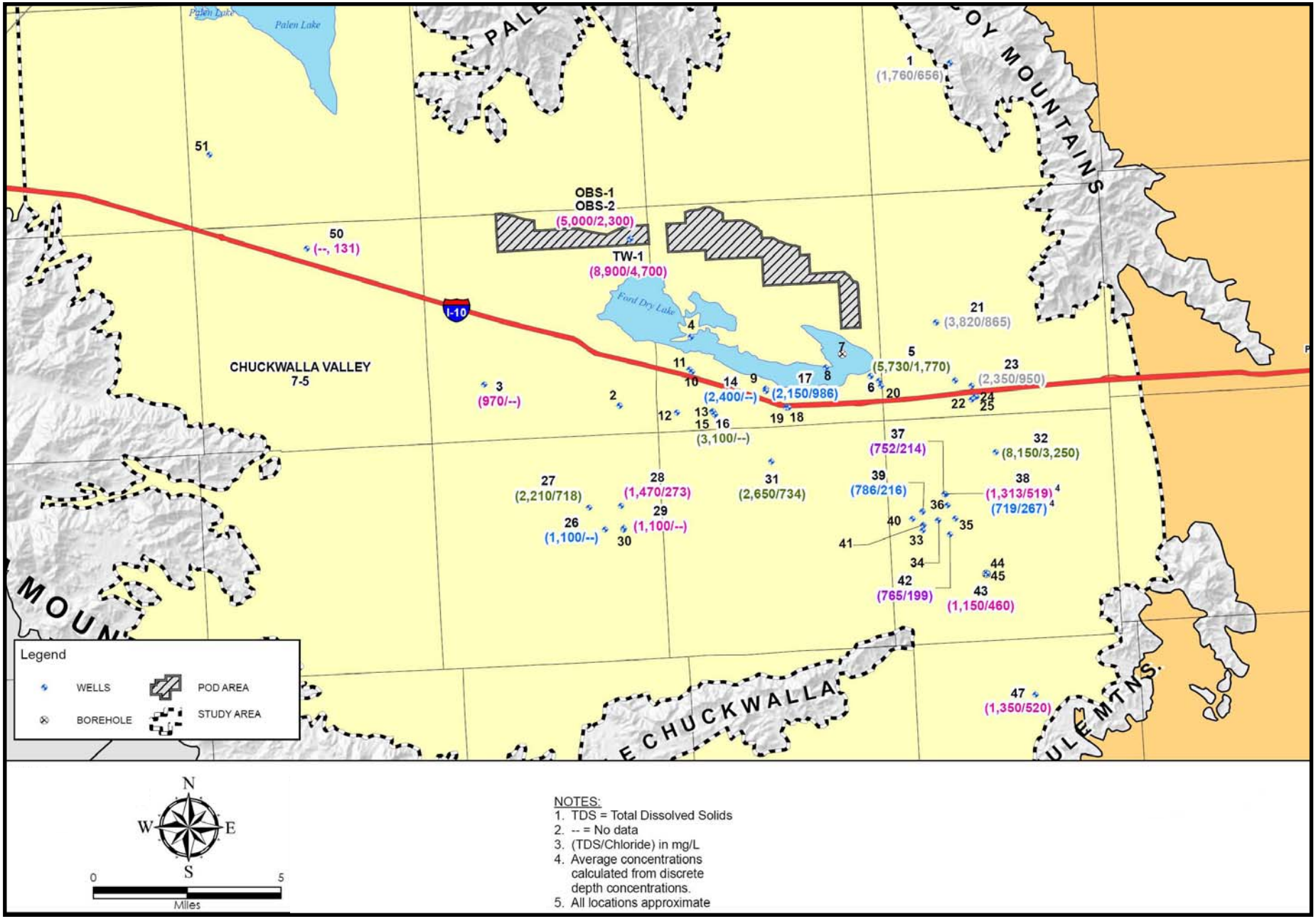
Genesis Solar Energy Project - Basin Wide Hydrographs - Chuckwalla Valley Groundwater Basin



SOURCE: AECOM2010a

SOIL AND WATER - FIGURE 14

Genesis Solar Energy Project - TDS and Chloride Concentrations Detected in Wells in the Eastern Chuckwalla Valley Groundwater Basin

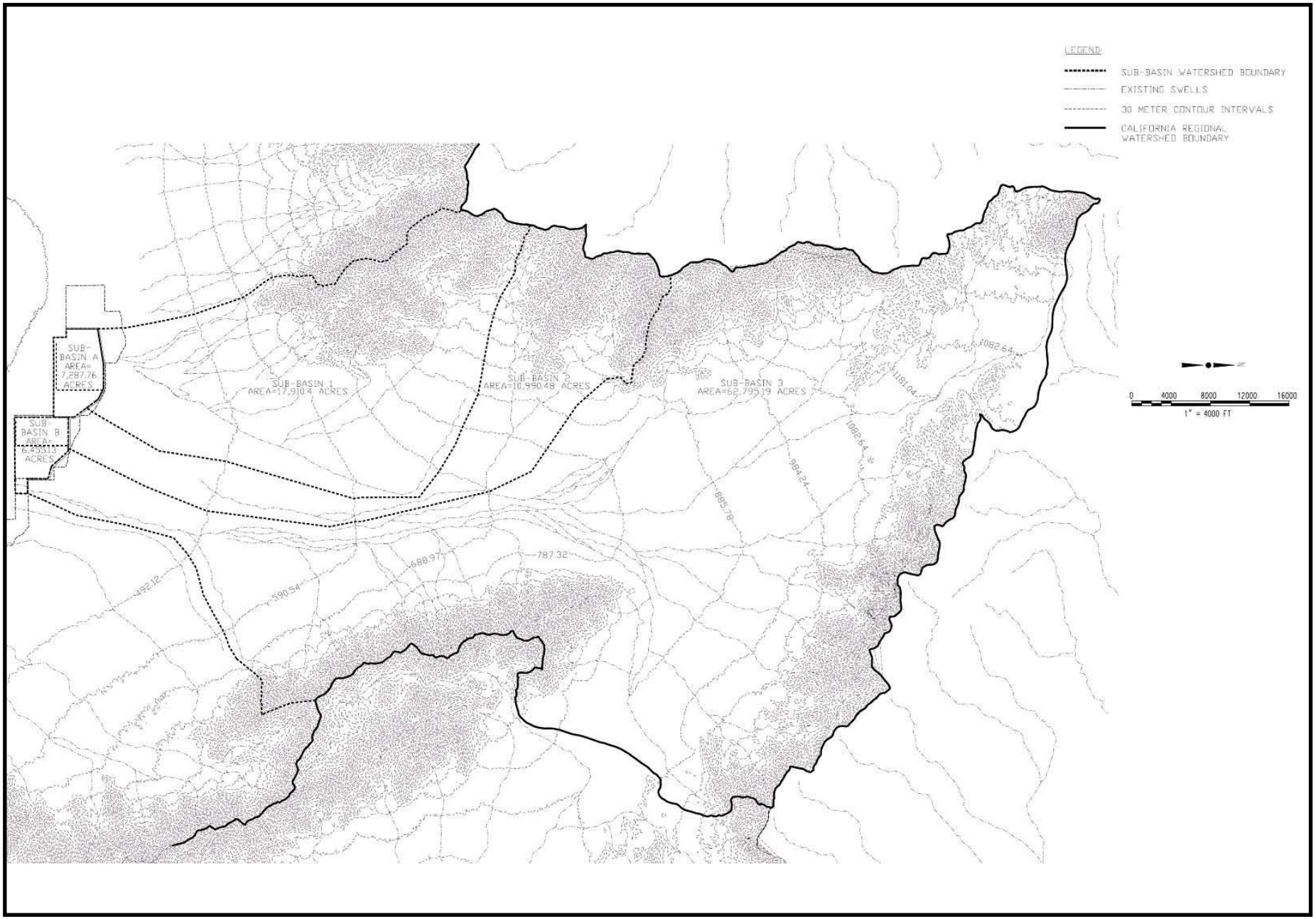


NOTES:
1. TDS = Total Dissolved Solids
2. -- = No data
3. (TDS/Chloride) in mg/L
4. Average concentrations calculated from discrete depth concentrations.
5. All locations approximate

SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 15

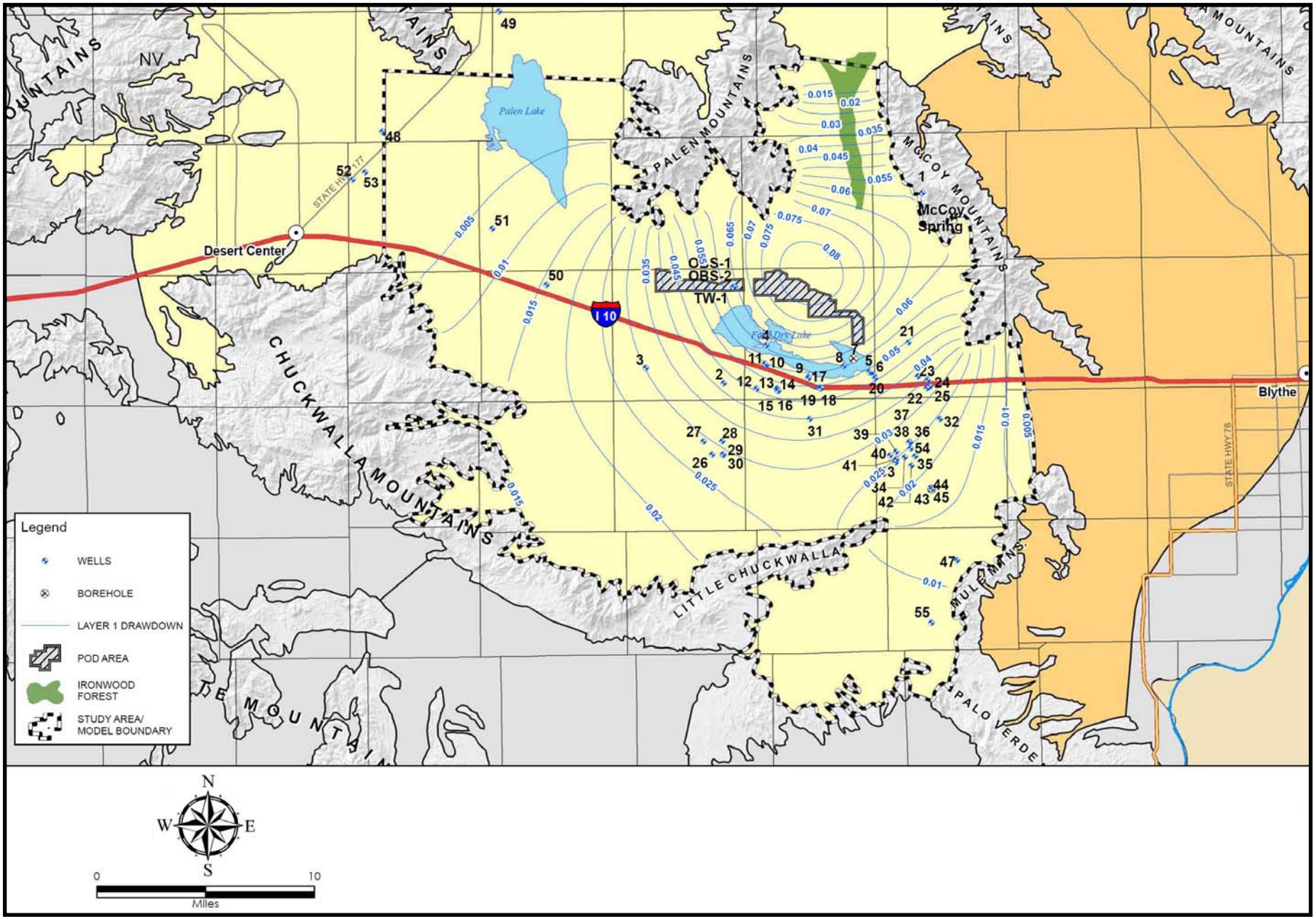
Genesis Solar Energy Project - Sub-Basin Watershed Boundaries



SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 16

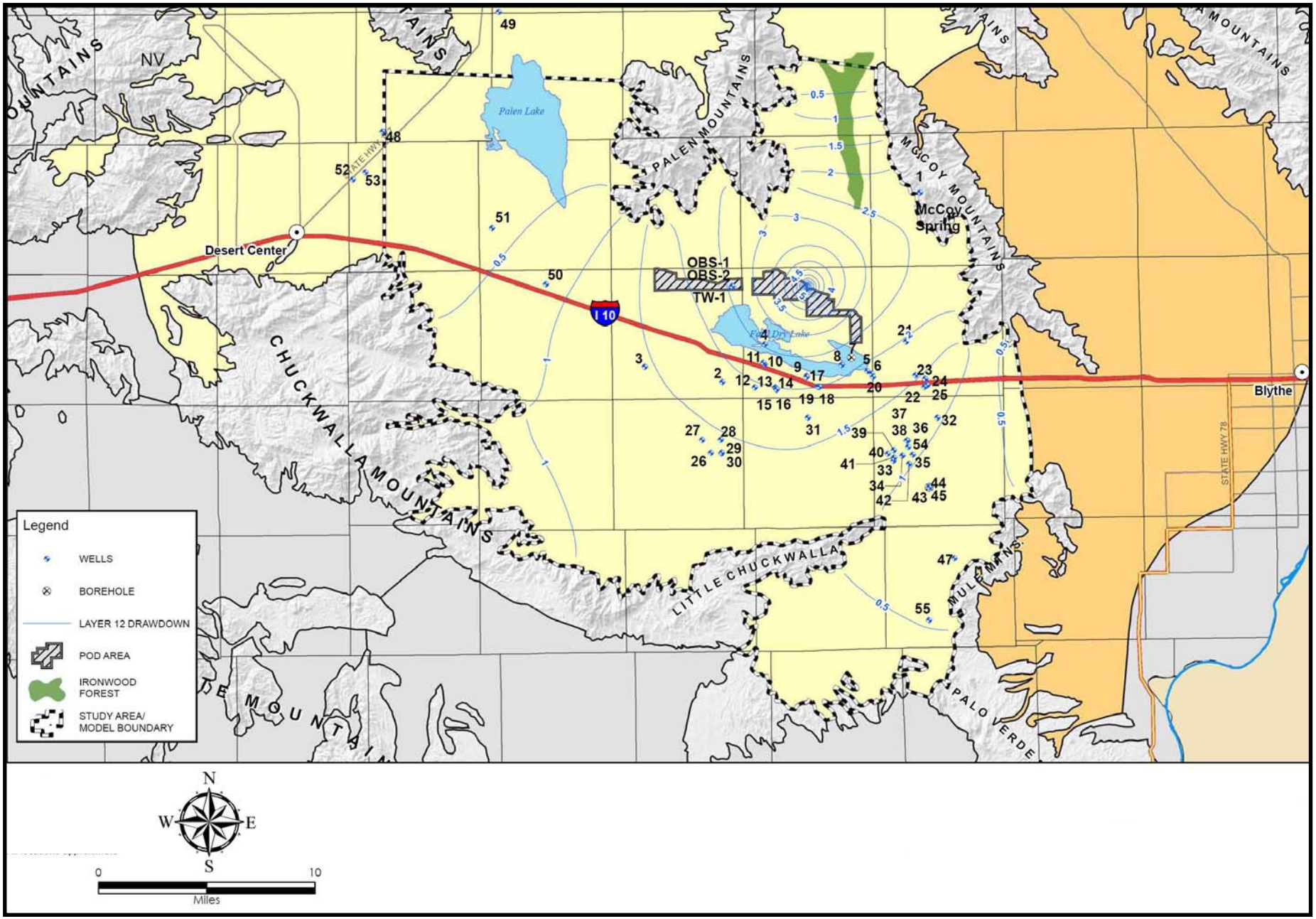
Genesis Solar Energy Project - Predicted Drawdown at the Water Table (Layer 1) after 33 Years



SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 17

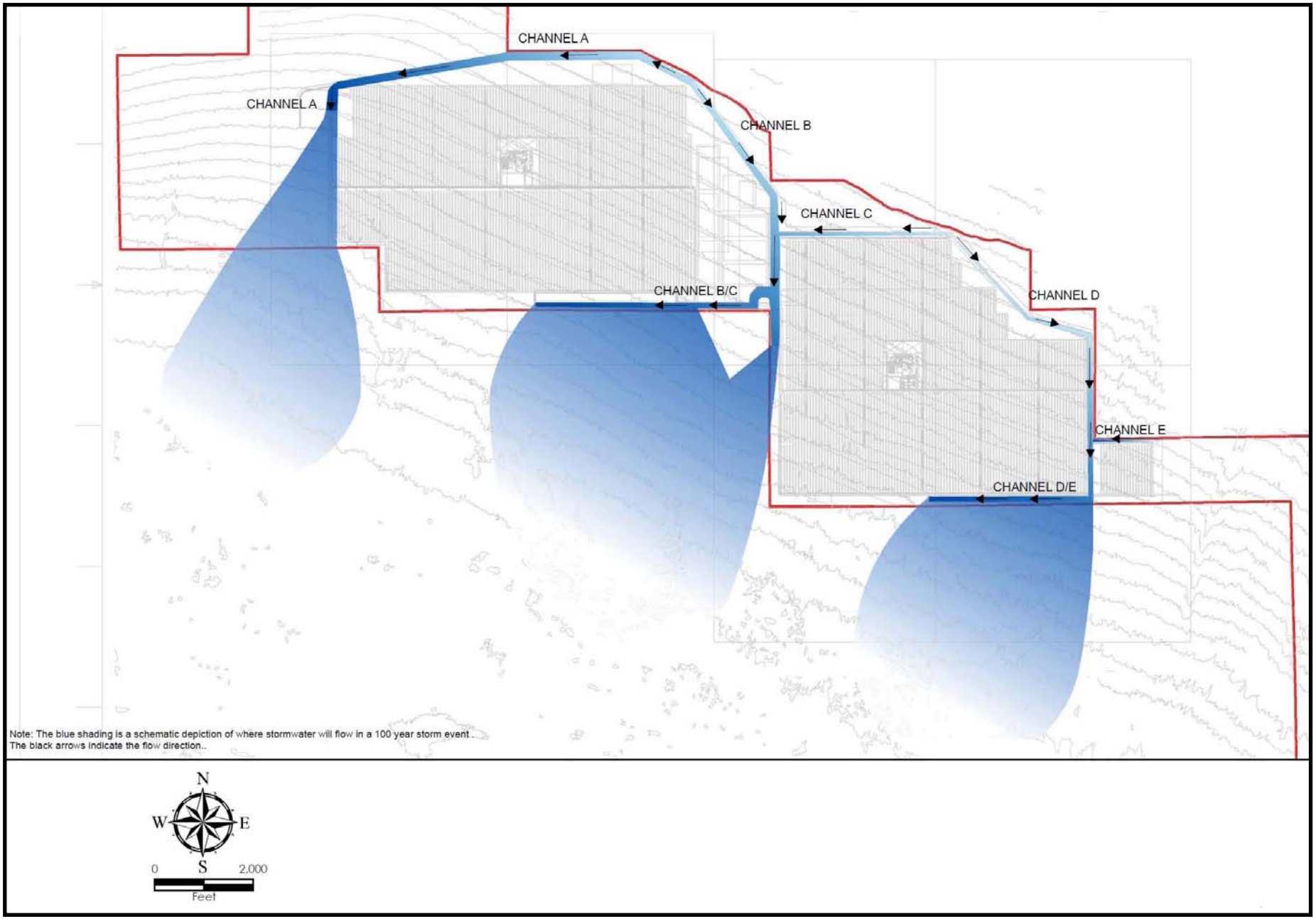
Genesis Solar Energy Project - Predicted Drawdown in the Pumped Aquifer (Layer 12) after 33 Years



SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 19

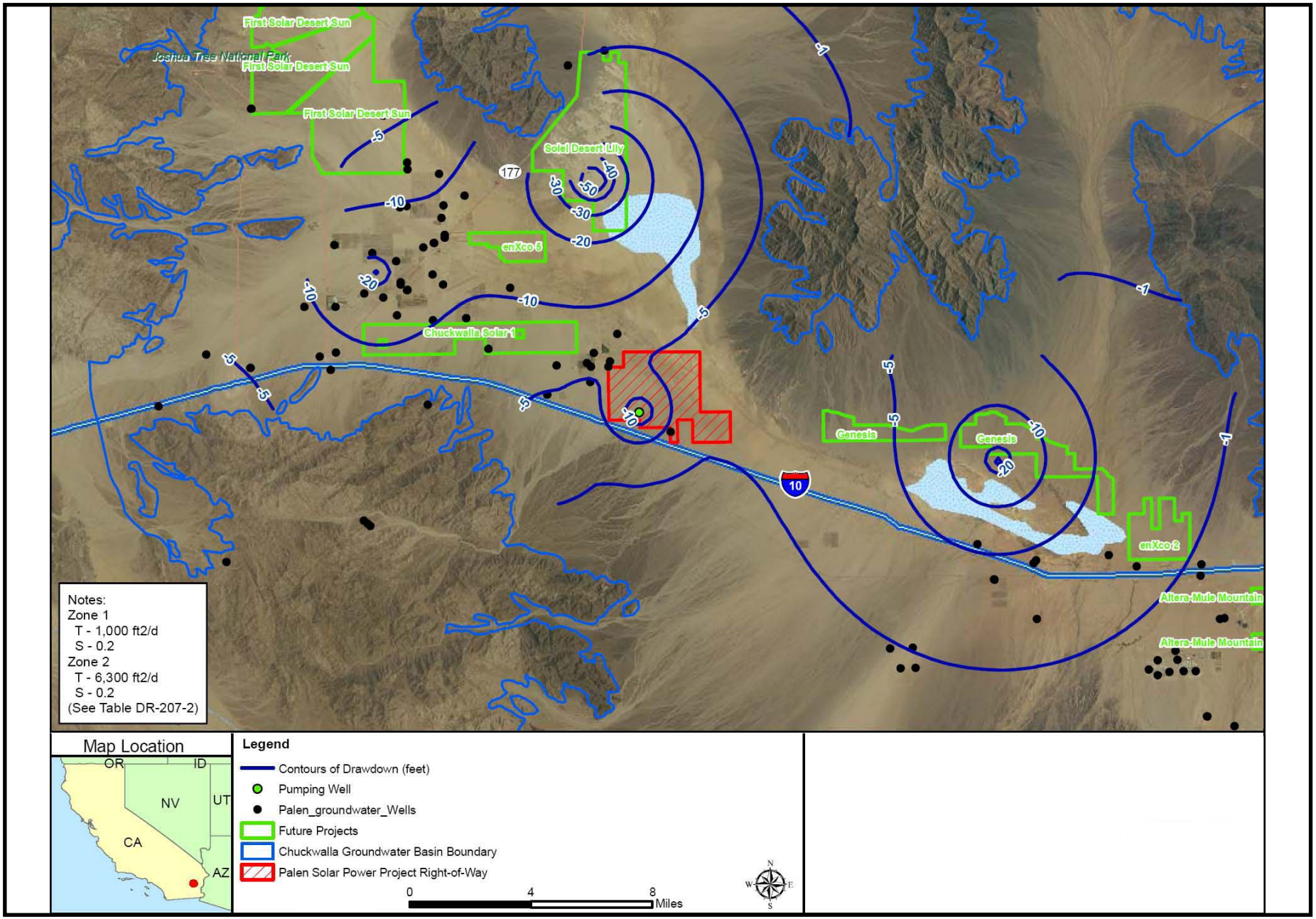
Genesis Solar Energy Project - Post Development Flow Patterns



SOURCE: GSEP 2009f

SOIL AND WATER - FIGURE 20

Genesis Solar Energy Project - Predicted Drawdown for Cumulative Foreseeable Projects after 33 Years



SOURCE: AECOM2010a

C.10 - TRAFFIC AND TRANSPORTATION

Testimony of Candace M. Hill

C.10.1 SUMMARY OF CONCLUSIONS

With implementation of the recommended conditions of certification, the Genesis Solar Energy Project would be consistent with the County of Riverside General Plan Circulation Element. The project would also be consistent with all other applicable federal, state, and local laws, ordinances, regulations, and standards related to traffic and transportation. As a result, the Genesis Solar Energy Project would not have a significant adverse impact on the local and regional roadway network. With implementation of recommend conditions of certification, during the construction and operation phases, local roadway and highway demand resulting from the daily movement of workers and materials would not increase beyond significance thresholds established by the County of Riverside for local roads and the State of California for state highways.[1]

C.10.2 INTRODUCTION

In the Traffic and Transportation analysis, staff focuses on (1) whether construction and operation of the Genesis Solar Energy Project (GSEP) would result in traffic and transportation impacts under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA); (2) whether the project would be in compliance with applicable laws, ordinances, regulations and standards (LORS).

The analysis identifies potential impacts related to the construction and operation of GSEP on the surrounding transportation systems and roadways. Staff proposes mitigation measures (condition of certification) where necessary.

C.10.2.1 PROJECT DESCRIPTION

The proposed GSEP is designed to utilize solar parabolic trough technology to generate electricity. The GSEP would consist of two independent solar electric generating facilities with a nominal net electrical output of 125 megawatts (MW), resulting in a total net electrical output of 250 MW.

The proposed project consists of approximately 1,800 acres located on Bureau of Land Management (BLM) acreage in eastern Riverside County. The project site is located approximately four miles north of Interstate 10 (I-10), 25 miles west of the city of Blythe and 27 miles east of the community of Desert Center.

Access to the site would be off Interstate 10 (I-10) via the Wiley's Well Road Interchange, which can be accessed by both eastbound and westbound traffic, and then north to a new six and half mile paved access road extending north and west from the existing Wiley's Well Road. If approved, the construction of GSEP would be completed

[1] The federal government (NEPA) has not established any standards for congestion, as this is a matter of local preference.

in two phases over a 37 month period. Phase 1 would consist of the Unit 1 powerblock, access road, gas, and transmission line and Phase 2 would consist of the Unit 2 powerblock.

C.10.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Significance criteria for project impacts to the surrounding traffic and transportation systems are based on three items:

1. California Environmental Quality Act (CEQA) Guidelines.
2. CEQA Environmental Checklist.
3. Performance standards and thresholds established by interested agencies.

The National Environmental Policy Act (NEPA) does not provide any standards specific to transportation.

A project may have a significant impact on traffic and transportation if it would:

1. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths and mass transit.
2. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.
3. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.
4. Substantially increase hazards due to a design feature or incompatible uses.
5. Result in inadequate emergency access.
6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Level of Service

When evaluating the project-related impacts on the local transportation system, staff bases its analysis on level of service (LOS) determinations. Level of service is a generally accepted measure used by traffic engineers, planners, and decision-makers

to describe and quantify the congestion level on a particular roadway or intersection in terms of speed, travel time, and delay.

The Highway Capacity Manual 2000, published by the Transportation Research Board, Committee on Highway Capacity and Quality of Service, includes six levels of service for roadways or intersections ranging from LOS A - the best operating conditions - to LOS F - the worst, most congested operating conditions. The County of Riverside uses the LOS criteria to assess the performance of its street and highway system and the capacity of roadway segments. The County's Circulation Element Policy C 2.1 requires "LOS C along all county maintained roads and conventional state highways."

Therefore, the LOS standards for GSEP as required by the County of Riverside and the State of California are LOS C on County roads and LOS C on State of California Interstate 10 (I-10), the main access to the project site.

A significant impact would be caused if the project causes intersection operations to exceed the accepted LOS standards on a county, state or federal roadway currently operating at LOC C or better to LOS D or worse.

C.10.4 PROPOSED PROJECT

C.10.4.1 SETTING AND EXISTING CONDITIONS

The GSEP site is located in eastern Riverside County, approximately four miles north of I-10, 25 miles west of the city of Blythe and 27 miles east of the community of Desert Center. The site is undisturbed desert land and the surrounding areas include the McCoy Mountains to the east, the Palen Mountains to the north, and Ford Dry Lake to the south of the site.

Regional vehicular access is provided by Interstate 10 (I-10) which is a four-lane, limited access, divided, east-west interstate highway. The California segment is a major traffic corridor that links the Greater Los Angeles Metropolitan Region eastward through the California desert, Arizona, and ultimately terminates at Jacksonville, Florida.
Access to the project site would be off Interstate 10 (I-10) via the Wiley's Well Road Interchange, which can be accessed by both eastbound and westbound traffic, and then north to a new six and half mile paved access road extending north and west from the existing Wiley's Well Road.

Local Highways and Roads

The following roads are located in the vicinity of the project site, Interstate 10 (I-10), United States 95 (US-95) and Wiley's Well Road:

Interstate 10 (I-10)

Interstate 10 (I-10) is a four-lane, limited access, divided, east-west interstate highway. The California segment is a major traffic corridor that links the Greater Los Angeles Metropolitan Region eastward through the California desert, Arizona, and ultimately terminates at Jacksonville, Florida. Due to the limited number of interchanges off I-10 in the vicinity, access to the project site is provided only from the Wiley's Well Road

Interchange, which can be accessed by both eastbound and westbound traffic. According to the Department of Transportation (Caltrans) 2008 average annual daily traffic (AADT) counts, I-10 carried approximately 24,600 vehicles west of Wiley's Well Road and 27,000 vehicles east of Wiley's Well Road.

United States 95 (US-95)

US-95 is a two-lane, north-south highway that traverses from the Canadian border in Idaho to the Mexican border near Yuma, Arizona. According to the Department of Transportation (Caltrans) 2008 average annual daily traffic (AADT) counts, US-95 carried approximately 3,500 vehicles north of I-10. In the vicinity of the GSEP site the highway lacks bicycle or pedestrian facilities.

Wiley's Well Road

Wiley's Well Road is a two-lane, arterial road accessed by eastbound and westbound traffic from the I-10 Wiley's Well Road Interchange. This road runs north of I-10 to serve the Department of Transportation (Caltrans) Wiley's Well Road Rest Area and terminates and south of I-10 to the Chuckawalla Valley and Ironwood State Prisons and points south. Access to the project site would be via a new six and half mile paved road extending north and west from Wiley's Well Road. The posted speed limit is 20 mph through the Wiley's Well Road Rest Area and the road lacks bicycle or pedestrian facilities.

PUBLIC TRANSPORTATION

Public transportation consists of bus service, bicycle and pedestrian facilities, airports, and rail service. Information about these forms of public transportation follows.

Bus Service

The Palo Verde Valley Transit Agency (PVVTA) and the Sunline Transit Agency provides public transit for eastern Riverside County. The nearest transit line to the project site is the PVVTA Red Route 3 Express which provides weekday service from the city of Blythe, to the Ironwood and Chuckawalla prisons located off Wiley's Well Road south of I-10. National bus service is provided by Greyhound Lines, which has a station located in the city of Blythe, city of Palm Springs and city of Indio.

Bicycle and Pedestrian Facilities

Due to the remoteness of the area and the distance to the nearest city being the city of Blythe, no bicycle facilities such as on-street lanes and off-street paths exist in the area. As a result, bicycle activity in the vicinity is minimal-to-none.

The County of Riverside Bicycle Master Plan Update (from September 2003) identifies all planned bicycle facilities in the county. However, the GSEP site is located outside of the Master Plan's study area and no bicycle facilities are planned for the study area.

In addition, due to the remoteness of the area, pedestrian facilities, such as sidewalks and walkways, do not exist.

Airports

Two airports are located in the general vicinity of the project site, Blythe Airport is located approximately 15 miles east of GSEP and is operated by the County of Riverside.
The privately-owned, non-commercial Desert Center Airport is located five miles northeast of the community of Desert Center and approximately 13 miles west of GSEP.

Rail Service

There is no freight rail service in the project area. The Arizona and California Railroad Company (ARZC) had previously provided rail service to Riverside and San Bernardino Counties, however, sought permission to abandon service to these counties from the Federal Surface Transportation Board (STB).

The STB on January 13, 2010 ruled the ARZC could abandon service in Riverside and San Bernardino County. Therefore, no rail service is available for the city of Blythe, the nearest siding to the GSEP within in Riverside County, or Vidal, California located in San Bernardino County.

In addition, no regional passenger railroad serves the project area. The nearest rail passenger service is an Amtrak station in Palm Springs, California or Yuma, Arizona.

C.10.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The direct and indirect impacts of the proposed GSEP on the transportation system are discussed in this section. The assessments of transportation-related impacts are based on evaluations and technical analysis which compare the pre-Project GSEP conditions to the post-Project GSEP conditions, including the following:

1. Studied intersection and road segment locations.
2. Direct/Indirect impacts and mitigation.
3. Construction period impacts and mitigation.
4. Operations impact and mitigation.
5. Emergency services vehicle access.
6. Water, rail and air traffic.
7. Impact on glare on motorists.
8. Parking capacity.
9. Transportation of hazardous materials.
10. Law, ordinances, regulations and standards (LORS).
11. Conflict with policies, plans or programs.

Study Intersection and Road Segment Locations

The following locations on the surrounding roadway network were reviewed:

1. I-10 at Wiley's Well Road, West of the Project Site.

2. I-10 at Wiley's Well Road, East of the Project Site.

3. US-95 at Hobsonway, North of the city of Blythe.

Direct/Indirect Impacts and Mitigation

Determinations of the direct and indirect impacts are based on relevant laws, ordinances, regulations and standards (LORS) pertaining to this project. To address direct and indirect impacts and mitigation, two major project scenarios have been evaluated: construction and operational phase.

Impacts were addressed for two separate future year scenarios: peak construction year (2012) and operational year (2012). Traffic during the decommissioning period would be expected at a level between those experienced during operation and construction and likely closer to the operational levels.

Construction Period Impacts and Mitigation

Potential traffic impacts associated with construction of the GSEP were evaluated for both construction workforce traffic and construction truck traffic.

Construction Workforce Traffic

The construction of GSEP would be completed in two phases over an approximately 37 month period beginning fourth quarter, 2010 and ending in third quarter, 2014. Phase 1 would consist of the Unit 1 powerblock, access road, gas and transmission line and Phase 2 would consist of the Unit 2 powerblock.

The construction workforce would peak during month 23 with approximately 1,093 workers per day and average approximately 652 workers during the course of construction.

A worst-case scenario, where all workers commute with only one occupant per vehicle, would yield a peak trip generation of approximately 1,093 inbound trips during the morning peak period and another 1,093 outbound trips during the evening peak period. Based on regional demographics, remoteness of the location and availability of skilled laborers, it is expected that the construction employees would be drawn from the Los Angeles Basin Region and greater Phoenix, Arizona. During construction, it is anticipated that construction workers and technical workers would reside in temporary housing during the week to be located in the city of Blythe and Parker, Arizona area.

To reach the GSEP site, construction workers would likely travel from the east and west and would primarily use I-10. It is anticipated approximately 75% of construction workers would travel from the east and 25% from the west. The workers would access the site off Interstate 10 (I-10) via the Wiley's Well Road Interchange.

Construction period parking demands are to be accommodated by a temporary on-site parking area of approximately 9 acres, which would be relocated around the project site as needed during different stages of construction. The size of the construction staging/laydown area was not described in the AFC but would be provided within the project site. In addition, a staging/laydown area would be provided at the Wiley's Well Road Rest Area for the construction of the generator tie line.
As **Traffic and Transportation Table 1** depicts, the LOS in 2012 for the three study intersections without the project would remain at LOS A. With the addition of GSEP construction traffic, LOS would change from A to B at one intersection, the I-10 interchange at Wiley's Well Road east of the project site. LOS B is an acceptable level of service on California state highways.

Traffic and Transportation Table 1
Comparison of Construction Year (2012) Roadway Segment Level of Service

	2012 Conditions without GSEP Construction Traffic [1]			***2012 Conditions with GSEP Construction Traffic [2]***		
Roadway Segment	***ADT***	***CAPACITY***	***LOS***	***ADT***	***CAPACITY***	***LOS***
I-10 at Wiley's Well Road, West of the Project Site	3,350	6,800	A	3,623	6,800	A
I-10 at Wiley's Well Road, East of the Project Site	3,700	6,800	A	4,520	6,800	B
US-95 at Hobsonway, North of Blythe,	450	2,000	A	655	2,000	A

1 – Year 2008 traffic volumes expanded to Year 2012 at historical rates from Year 2004 to 2008 (3.8% for Wiley's Well Road west; 6.8% for Wiley's Well Road east and 8.6% for US-95)

2 – Month 23 peak construction traffic with 1,093 workers (Assumes 75% traveling from the east and 25% traveling from the west.)

This decrease in the LOS at this intersection is consistent with the proposed construction traffic patterns as it is anticipated approximately 75% of the traffic would utilize the eastbound Wiley's Well Road Interchange. Traffic volumes would increase from 3,700 ADT to 4,520 ADT. As a result of this increase, vehicles could become stacked as drivers exit I-10.

While traffic volumes would increase, the LOS at the study intersections and roadway segments would remain within the LOS thresholds identified by the state and local jurisdictions. All study roadway segments and intersections are expected to operate at LOS A and at LOS B at one intersection with the GSEP-related construction traffic as shown in **Traffic and Transportation Table 1**. Therefore, direct impacts on LOS from GSEP-related construction traffic would be less than significant and mitigation would not be required.

While the GSEP would not create significant direct impacts related to traffic congestion, the construction of the GSEP may overlap with two other solar projects in the immediate vicinity, the Palen Solar Power Project (PSPP) and the Blythe Solar Power Project (BSPP), and cause significant cumulative impacts. All three projects would utilize I-10

and at peak construction employ approximately 3,000 employees. The Cumulative Impacts and Mitigation section discuses these three projects and proposed mitigation (see Condition of Certification **TRANS-1**).

Construction Truck Traffic

GSEP construction is expected to generate approximately 15 to 20 one way truck trips per day peaking at approximately 50 to 75 trucks per day. The peak truck travel would not coincide with the peak month 23 construction timeframe.

In addition to the standard equipment, several pieces of equipment that exceed roadway or size limits would need to be transported to the GSEP site via I-10 during construction. This equipment includes the steam turbine generator and main transformers. The AFC indicated this equipment would have been delivered via the Arizona and California Railroad Company at either Vidal, California or Parker, Arizona. However, as previously discussed, rail service has since been eliminated. As a result, the nearest siding to the project site would be the Parker site. The equipment would be transported using multi-axle trucks from US-95 to I-10. To transport this equipment along highway corridors, the applicant must obtain special permits from the Department of Transportation (Caltrans) to move oversized or overweight materials. The Department of Transportation (Caltrans), District 8, commented that GSEP would be required to obtain permits for vehicles/load exceeding limitations on size and weight.

Oversized or overweight trucks with unlicensed drivers could be hazardous to the general public and/or damage roadways. Condition of Certification **TRANS-2** requires that the project owner comply with limits on vehicle sizes and weights and driver licensing regulations. Improper transportation of hazardous materials could also prove a danger to the general public, therefore, Condition of Certification **TRANS-4** requires the owner to secure permits and licenses for the transport of hazardous materials. Finally, even properly sized and licensed trucks could damage roadways. For this reason, Condition of Certification **TRANS-5** requires that the owner restore all roads damaged by construction activities.

Operation Impacts and Mitigation

Due to the nature and remote location of the GSEP project, a relatively minor amount of traffic would be generated to and from the site during standard operations.

Operation of the facility would require a labor force of up to 66 full-time employees operating round-the-clock. In a worst-case scenario, where all workers commute with only one occupant per vehicle, would generate 132 employee commute trips spread over a 24-hour period.

In addition, GSEP would generate approximately 38 truck trips per month (average of one to two truck trips per day) for delivery of materials and supplies. Approximately 15 of these truck trips per month would be for the delivery of hazardous materials. Delivery drivers and workers would use the Wiley's Well Road interchange from either eastbound or westbound I-10 to access the site. To ensure safe handling and transportation of hazardous materials, staff proposes Condition of Certification **HAZ-3** requiring the applicant to develop and implement a Safety Management Plan for the

delivery and handling of liquid and gaseous hazardous materials. Please see the **Hazardous Materials Management** section of this document.

These trip additions of employees or deliveries would not cause a significant impact to the highways. It is anticipated the LOS will remain at LOS A. **Traffic and Transportation Table 2** includes information regarding the expected traffic volumes during standard operations with the base traffic volumes on the study roadway segments. The average daily traffic (ADT) volumes are expected to remain low. As indicated, the study roadway segments are expected to experience a nominal increase in GSEP-related traffic. Therefore, operations impacts from GSEP-related traffic are considered less than significant.

Traffic and Transportation Table 2
Comparison of Standard Operations (Year 2012) Traffic on Study Roadways

	Standard Operations Year 2012 Without GSEP [1]		***Standard Operations Year 2012 With GSEP [2]***		***Percent Change Associated with GSEP***
Roadway Segment	***ADT***	***CAPACITY [3]***	***ADT***	***CAPACTIY [3]***	
I-10 at Wiley's Well Road, West of the Project Site	3,350	6,800	3,367	6,800	0.5%
I-10 at Wiley's Well Road, East of the Project Site	3,700	6,800	3,750	6,800	1.35%
US-95 at Hobsonway, North of Blythe	450	2,000	462	2,000	2.7%

1 - Year 2008 traffic volumes expanded to Year 2012 at historical rates from Year 2004 to 2008 (3.8% for Wiley's Well Road west; 6.8% for Wiley's Well Road east and 8.6% for US-95)
2 – Project operations with 66 employees (Assumes 75% traveling from the east and 25% traveling from the west; split shifts spread over a 24 hour period.)
3 – Two-way capacity in vehicles per hour

Traffic and Transportation Table 3 includes information regarding the level of service of the study roadway segments during standard operations. As shown, the study roadway segments are expected to operate at the same condition, LOS A, as in existing conditions.

Traffic and Transportation Table 3
Standard Operations (Year 2012) Roadway Segment Level of Service Summary

Roadway Segment	***Standard Operations Year 2012 Without GSEP [1]***		***Standard Operations Year 2012 with GSEP [2]***	
	ADT	**LOS**	**ADT**	**LOS**
I-10 at Wiley's Well Road, West of the Project Site	3,350	A	3,367	A
I-10 at Wiley's Well Road, East of the Project Site	3,700	A	3,750	A
US-95 at Hobsonway, North of Blythe	450	A	462	A

1 - Year 2008 traffic volumes expanded to Year 2012 at historical rates from Year 2004 to 2008 (3.8% for Wiley's Well Road west; 6.8% for Wiley's Well Road east and 8.6% for US-95)

2 - Project operations with 66 employees (Assumes 75% traveling from the east and 25% from the west; split shifts over a 24 hour period.)

LINEAR FACILITIES

The proposed GSEP new transmission line, as well as the new access road and natural gas pipeline would be co-located in one linear corridor to serve the main GSEP facility. This corridor would exit the facility to the south and would be approximately six and half miles long. The generation tie-line would cross Interstate 10 (I-10), and tie into the Blythe Energy Project Transmission Line. The GSEP generation tie-line would use the existing pole structures of the Blythe Energy Project Transmission Line to interconnect with the Southern California Edison's proposed Colorado River Substation, to be located south and west of the city of Blythe.

Potential construction impacts associated with the construction of the transmission line route and conductor installation include the movement of heavy equipment, trucks, and worker vehicles along access routes.

Construction of the transmission line route and conductor installation would not directly impact traffic operations as staging areas would be established within existing rights of way. Several aspects of the transmission line tower construction and conductor installation could potentially result in impacts. These include: 1) Workforce related traffic and 2) Transmission line roadway crossings. These two issues are discussed below.

The construction of the transmission line would require approximately 35 workers and consist of the following: preparation of the marshalling yards, access road and spur road construction (which would require approximately 25 workers), clearing and grading of pole sites, foundation preparation and installation of poles, conductor installation and lastly, cleanup and site reclamation.

The construction of the natural gas pipeline would be the responsibility of Southern California Gas Company and would require approximately 46 workers over a three to six month period. The construction of the natural gas pipeline would consist of the following: trenching, stringing, installation and backfilling.

The construction of these facilities would occur during peak periods however, the construction would not coincide with the peak of the plant site construction employment (during Month 23).

The distribution of the transmission line construction workforce would be along the length of the route. The construction would be completed by several crews working simultaneously along the route to minimize impacts during the construction period.

Two staging areas would be established for the transmission line to store equipment and materials and to provide field offices: one at the proposed GSEP site and another at the Wiley's Well Road Rest Stop area. Employees would report to these staging areas at the beginning of their shift to receive work assignments and then distribute themselves as needed to various work sites along the transmission line route.

Condition of Certification **TRANS-1** requires a traffic control plan for the three solar projects which consist of the following:

- To coordinate construction schedules;
- To ensure that during overlapping construction periods traffic control measures such as staggered work schedule start times, and;
- Incentives for carpooling, such as an employer-sponsored Commuter Check Program.

With implementation of these measures, the transportation related impacts would be less than significant.

The transmission line route would cross Interstate 10 and would require the use of heavy equipment. The Department of Transportation (Caltrans), District 8, commented that GSEP would be required to obtain permits for vehicles/load exceeding limitations on size and weight. Therefore, staff has recommended Condition of Certification **TRANS-3** which requires the applicant obtain encroachment permits to encroach into public rights-of-ways. In addition, Condition of Certification **TRANS-5** requires that the applicant restore all roads damaged by construction activities.

Given the distribution among the two staging sites and the coordinated Traffic Control Plan (Condition of Certification **TRANS-1**) and requirement for encroachment permits from the Department of Transportation (Caltrans) as well as the requirement to restore any damaged roads from construction activities, traffic impacts associated with workforce related traffic and transmission line roadway crossings are considered less than significant.

Emergency Services Vehicle Access

The environmental review of emergency service vehicle access considers the off-site accessibility by emergency vehicles to the site. It is staff's opinion that the regional access to the site is adequate based on emergency vehicles can access the site directly from I-10 via the new access road that would connect with Wiley's Well Road.

On-site circulation and secondary emergency access for vehicles would be subject to site plan review by the Riverside County Fire Department per Condition of Certification **Worker Safety-6** in the **Worker Safety and Fire Protection** section of this document. The emergency access road would be provided via a new "spur road" that connects to the main new access road. Refer to the **Worker Safety and Fire Protection** section for a discussion of the proposed "spur road". Roads also will be built to County and Fire Code requirements for adequate access for emergency vehicles.

Water, Rail, and Air Traffic

The proposed GSEP is not adjacent to a navigable body of water; therefore, the GSEP would not to alter water-related transportation. In regards to rail, there are no rail tracks on or near GSEP.

The Federal Aviation Administration (FAA) requires an analysis of facilities located within 20,000 feet of an airport. No commercial airport or military airport is located within 20,000 feet of the GSEP site boundary.

Transport of Hazardous Materials

Both the construction and operation of the proposed GSEP would involve the transport of hazardous materials to the site. The transport vehicles are required to follow federal regulations governing the proper containment vessels and vehicles, including appropriate identification of the nature of the contents.

In addition to the governing federal regulations, staff has recommended Condition of Certification **TRANS-4** requiring the applicant to obtain appropriate permits from the California Highway Patrol and Department of Transportation (Caltrans) for the delivery of hazardous materials.

In addition, Condition of Certification **HAZ-3** requires the applicant to develop and implement a Safety Management Plan for the delivery and handling of liquid and gaseous hazardous materials. Please see the **Hazardous Materials Management** section of this document.

Glare Impact on Motorists

The Visual Resources section of this document includes general information about the impacts of glare. The traffic and transportation section contains information about glare as it relates to motorists.

The GSEP power blocks and solar arrays would occupy approximately 1,360 acres of the 1,800 acres of the BLM site. A parabolic trough is a type of a solar thermal energy collector. Constructed as a long parabolic mirror, a Dewar tube runs its length at the focal point. Sunlight is reflected by the mirror and focused on the Dewar tube. The trough is usually aligned on a north-south axis and rotated to track the sun as it moves across the sky each day. Troughs are stowed facing the ground, a position from which no glare occurs.

When a parabolic trough rotates from the stowed position to the tracking position in the morning and in the reverse in the evening they produce a linear reflected solar image which may be visible briefly to nearby observers. Within a zone of 20 meters from the plan perimeter this image may exceed an energy level deemed safe for the human eye of 4.5 kW/m^2. Based on the distance of the GSEP from I-10, there does not appear to be a danger of retinal damage. However, distant observers such as motorists on nearby highways may encounter “bright spots” which are generated from the bottom edge of the mirrors which are the result of a tangentially reflected image of the sun presented by spread reflection. This spot will move as the observer changes relation to the sun and appear to "follow" the observer. Since this moving spot is several orders of brightness greater than the reflected sky and clouds on the mirrors, it may be an annoying distraction. To mitigate this impact, staff has recommended Condition of Certification

VIS-4 Reduction of Glint and Glare, in the **Visual Resources** section. This condition will require a chain link fence, minimum 10-feet in height, installed around the entire project perimeter and include opaque privacy slats in order to reduce brightness of spread reflection.

Parking Capacity

The project would include a temporary parking area of approximately nine acres for construction workers, based on 350 square feet per vehicle. The parking area would be relocated around the site as construction progresses. An additional area would be required for staging and laydown of equipment, materials and supplies. This staging and laydown area would also be relocated around the site as construction progresses.

The parking area would accommodate all construction workforce vehicles if workers commuted individually; however, based on the traffic control plan which would include staggered work hours and incentives for carpooling, such as employer-sponsored Commuter Check Program (per Condition of Certification **TRANS-1**), this parking area would be oversized.

During operations, employees would park on-site in a combined administration/parking area. Figure 3.4-1 in the AFC, depicts the administration and warehouse covering approximately 39,000 square feet. Approximately 23,100 square feet would be required for the parking area, based on 350 square feet per vehicle which would accommodate approximately 66 vehicles. This would adequately accommodate the 66-employee workforce, as employees would not be on-site simultaneously as they would work different shifts to staff the GSEP 24 hours a day, 7 days a week.

With the proposed construction parking area on-site as well as on-site parking for operational employees, the project would not result in any parking spill-over to sensitive areas or create any adverse impacts.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff uses LORS as significance criteria to determine if the proposed GSEP project would have a significant adverse impact on the environment. The federal, state, and local regulations that are applicable to the proposed GSEP are listed in **Traffic and Transportation Table 4.**

Traffic and Transportation Table 4
Laws, Ordinances, Regulations and Standards

Applicable LORS	Description
Federal	
Title 49 Code of Federal Regulations (CFR) Subtitle B, Parts 171-173, 177-178, 350-359, 397.9 and Appendices A-G	Addresses safety considerations for the transport of goods, materials, and substances. Governs the transportation of hazardous materials including types of materials and marking of the transportation vehicles.
State	
California Vehicle Code (VC) Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620; California Health and Safety Code Section 25160 et seq.	Regulates the highway transport of hazardous materials.
VC Sections 13369; 15275 and 15278	Addresses the licensing of drivers and the classification of licenses required for the operation of particular types of vehicles; also requires certificates permitting operation of vehicles transporting hazardous materials.
VC Sections 35100 et seq.; 35250 et seq.; 35400 et seq.	Specifies limits for vehicle width, height, and length.
VC Section 35780	Requires permits for any load exceeding the Department of Transportation (Caltrans) weight, length, or width standards on public roadways.
California Streets and Highways Code Section 117, 660-672	Requires permits for any load exceeding Department of Transportation (Caltrans) weight, length, or width standards on County roads.
California Streets and Highways Code Sections 117, 660-670, 1450, 1460 et seq., and 1480 et seq.	Regulates permits from Department of Transportation (Caltrans) for any roadway encroachment from facilities that require construction, maintenance, or repairs on or across State highways and County roads.
Local	
Riverside County General Plan Circulation Element	Specifies long-term planning goals and procedures for transportation infrastructure system quality and specifies LOS standards used to assess the performance of a street or highway system and the capacity of a roadway.
Riverside County Municipal Code Title 10, Chapter 10.08, Sections 10.08.010-10.08.180	Specifies limits and permit requirements for oversize loads.
Riverside County Municipal Code Title 12, Chapter 12.08, Sections 12.08.010-12.08.100	Specifies requirements for encroachment permits.

Conflict with Policies, Plans, or Programs

GSEP would not conflict with any formal policies, plans, or programs related to transportation aspects of the project.

C.10.4.3 CEQA LEVEL OF SIGNIFICANCE

With implementation of conditions of certification, the impacts of the GSEP project as proposed would be less than significant for issues related to traffic and transportation.

C.10.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50% of the proposed project area so all impacts are reduced, and (2) by retaining the eastern solar field, which is located on flowing desert washes, it would reduce impacts to the sand dune and playa areas and to the Mojave Fringe-toed Lizard habitat. The alternative would also reduce impacts to wildlife movement by reducing obstruction of the Palen wash and would maintain, thru both fluvial and Aeolian processes, the dune and sandy habitats. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.10.5.1 SETTING AND EXISTING CONDITIONSC

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.10.5.2 ASSESMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Reduced Acreage Alternative would have a similar impact on the traffic and transportation system as the proposed project. This is due to the fact that the Reduced Acreage Alternative uses similar project access and numbers of construction workers, operators, and truck deliveries. If anything, the Reduced Acreage Alternative may have fewer impacts than the proposed project because it is smaller in size.

C.10.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, impacts would be less than significant with mitigations and would not cause an unacceptable LOS.

C.10.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

C.10.6.1 SETTING AND EXISTING CONDITIONS OF MITIGATION

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.10.6.2 ASSESMENT OF IMPACTS AND DISCUSSION OF MITIGATION

With implementation of conditions of certification, no new impacts to traffic and transportation would be created with the use of ACC's in place of cooling towers. Therefore, the impacts of the GSEP project as proposed would be less than significant for issues related to traffic and transportation.

C.10.6.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, impacts would be less than significant with mitigations and would not cause an unacceptable LOS.

C.10.7 NO PROJECT/NO ACTION ALTERNATIVE

CEQA NO PROJECT ALTERNATIVE

The No Project Alternative under CEQA defines the scenario that would exist if the proposed Genesis Solar Energy Project were not constructed. The CEQA Guidelines state that "the purpose of describing and analyzing a 'no project' alternative is to allow decision makers to compare the impacts of approving the proposed project with the

impacts of not approving the proposed project" (Cal. Code Regulations.. 14 § 15126.6(i)). The No Project analysis in this SA/DEIS considers existing conditions and "what would be reasonably expected to occur in the foreseeable future if the project were not approved…" (Cal. Code Regulations. 14 § 15126.6(e)(2)).

If the No Project Alternative were selected, the construction and operational impacts of the Genesis Solar Energy Project would not occur. There would be no grading of the site, no loss of resources or disturbance of desert habitat, and no installation of power generation and transmission equipment. The No Project Alternative would also eliminate contributions to cumulative impacts on a number of resources and environmental parameters in Riverside County and in the Mojave Desert as a whole. In the absence of the Genesis Solar Energy Project, however, other power plants, both renewable and non-renewable, may have to be constructed to serve the demand for electricity and to meet RPS. The impacts of these other facilities may be similar to those of the proposed project because these technologies require large amounts of land like that required for the Genesis Solar Energy Project. The No Project/No Action Alternative may also lead to siting of other non-solar renewable technologies to help achieve the California RPS.

Additionally, if the No Project/No Action Alternative were chosen, additional gas-fired power plants may be built, or that existing gas-fired plants may operate longer. If the proposed project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide, and California utilities would not receive the 250 MW contributions to its renewable state-mandated energy portfolio.

NEPA NO ACTION ALTERNATIVES

Under NEPA, the No Action Alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives. Like the No Project Alternative described above, under the No Action Alternative, the impacts of the Genesis Solar Energy Project would not occur.

BLM is considering two separate actions (whether to approve a plan amendment and whether to approve the proposed project or an alternative). BLM's "action alternative" would be to amend the CDCA Plan to include Genesis Solar Energy Project (250 MW), and to approve the project as proposed. The Genesis Solar Energy Project and ancillary facilities are approved, a ROW grant is issued, and the CDCA Plan is amended to include the Genesis Solar Energy Project generation facilities and transmission line as an approved site under the Plan. Similarly, BLM could amend CDCA Plan to include one of the alternatives fully analyzed in this Draft EIS (the Reconfigured Alternative or Reduced Acreage Alternative), and approve the construction and operation of those alternatives. The alternative and ancillary facilities would be approved, a ROW grant for the appropriate acreage would be issued, and the CDCA Plan would be amended to include the alternative power generation facilities and transmission line as an approved site under the Plan.

BLM's alternatives related to the No Action Alternative and the Plan amendment are the following:

- **No Action on project but amend the CDCA plan to make the area available for future solar development.** The Genesis Solar Energy Project is not approved (project denied), and no ROW grant is issued to SES, but the CDCA plan is amended to make the project area available for large scale renewable energy development under a future project .
- **No Action on project and amend the CDCA plan to make the area unavailable for future solar development.** The Genesis Solar Energy Project is not approved (project denied), and no ROW grant is issued to SES, and the CDCA plan is amended to make the project area unavailable for large scale renewable energy development.
- **No Action on project application and on land use plan amendment**. The Genesis Solar Energy Project is not approved (denied), no ROW grant is issued, and no CDCA Plan amendment is approved. There is no consideration of information that would allow approval of a CDCA Plan amendment that would make the land available for large scale energy development in the future.

C.10.8 CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. *Cumulatively considerable* is interpreted to mean that the incremental effects of an individual project are significant when viewed in connection with the effects of (1) past projects; (2) other current projects; and (3) probable future projects (California Code Regulation, Title 14, Section 15130). According to the National Environmental Policy Act (NEPA), cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7).

The potential exists for substantial future development throughout the Southern California Desert Region as well as on the Interstate 10 (I-10) corridor in eastern Riverside County. See **Traffic and Transportation, Figure 3**, 1-10 Corridor Existing and Proposed Projects.

Energy Commission staff has limited the traffic and transportation analysis to the I-10 corridor of eastern Riverside County, the location of the proposed Blythe, Palen, and Genesis solar projects. These three projects were included in one cumulative analysis for the following reasons:

1. Access to all three projects is off I-10.

2. All three projects exist in close proximity to one another and their construction schedules would overlap. Construction schedules are projected to overlap beginning in fourth quarter 2010 through 2016. Therefore, to accurately reflect the cumulative impacts, all three proposed projects must be considered cumulatively. Refer to **Traffic and Transportation, Figure 3** for the location of all three proposed projects.

The analysis in this section first defines the geographic area over which cumulative impacts to traffic and transportation could occur. It then provides information about the potential for cumulative impacts to occur as a result of implementation of the Blythe, Palen, and Genesis solar projects along the I-10 corridor in addition to the applicable local and regional projects listed in **Traffic and Transportation, Figure 3**.

Geographic Extent

The Blythe Solar Power Project (BSPP), Palen Solar Power Project (PSPP), and Genesis Solar Energy Project (GSEP) are located within 45 miles of the city of Blythe on the I-10 corridor. The Bureau of Land Management has developed coordinated management plans for various areas in the California desert owned by the federal government. These three proposed solar facilities are included within the Northern and Eastern Colorado Desert Coordinated Management Plan.

For this same 1-10 corridor in which Blythe, Palen, and Genesis solar facilities are proposed, approximately 20 additional energy-related projects, including solar, wind, pumped storage, and transmission lines, are being considered or expected to be considered for development by the Federal Energy Regulatory Commission (FERC); Bureau of Land Management (BLM); and the California Energy Commission. In addition, local residential and commercial development is proposed during this period. As a result, traffic could be cumulatively affected.

Cumulative impacts could occur to both the local roadway network and the regional roadway network. Cumulative impacts to the local roadway network would occur if the impacts of the three projects are combined with impacts of projects already located or to be located within the same general vicinity of the Blythe, Palen, and Genesis solar projects. Local impacts include damage to local roadways; traffic delays due to road closures; and increased congestion from project-related traffic.

Cumulative impacts could also affect the regional roadway network if impacts were to occur on I-10, the primary access to the three project sites. I-10 is the southernmost east–west, coast-to-coast highway in the United States, stretching from Santa Monica, California, through Phoenix and Tucson, Arizona; New Mexico, Texas, Louisiana, Mississippi, Alabama, and connecting to Interstate 95 in Jacksonville, Florida.

In California, the Santa Monica Freeway comprises the western most segment of I-10. I-10 merges with the Santa Monica Freeway and the San Bernardino Freeway and goes eastward to Riverside County. Traffic on I-10 is significantly reduced as it flows through Coachella and into the Mojave Desert.

In this analysis, Energy Commission staff concentrates on the cumulative impacts on traffic and transportation along I-10 for approximately 170 miles beginning near Indio, California, and ending approximately 50 miles west of Blythe, California. [2]

[2] The Mojave Desert covers an area of approximately 25,000 square miles. In California, the Mojave Desert is bordered on the south by I-10; on the west by US 395. The desert's northern border is US 50, its southern border, I-15 in Nevada.

The three projects analyzed in this section expect to employ more than three thousand workers during the peak construction period. For the three projects the construction workforce is expected to come from the surrounding local and regional area, including workers from the Los Angeles basin and the Phoenix, Arizona area. However, the majority of construction workers for the three proposed projects are expected to live or reside temporarily in the Indio, Blythe, or Parker, Arizona area, which is about 35 miles north of I-10. All workers would arrive at the project sites via I-10 east and I-10 west.

The regional cumulative impacts analysis of these three projects does not include currently proposed solar and wind projects located more than 45 miles east and west and 30 miles north of the Blythe Solar Power Project. This is based on the vast area over which these projects are spread and as a result, the projects would utilize different interchanges and roadways of I-10 making the impacts from projects further away unlikely. In addition, cumulative impacts from beyond this area would be tempered by: differing construction schedules; combined CEQA/NEPA requirements for mitigating significant cumulative traffic impacts; and the California Energy Commission's conditions of certification for ensuring that no significant cumulative impacts result from the Blythe, Palen and Genesis projects.

Potential Environmental Impacts

Local Impacts

Construction and operation and equipment deliveries for the Blythe, Palen, and Genesis solar projects are as follows:

Blythe

Construction of the BSPP would be completed over an approximately 69-month period, beginning in fourth quarter 2010 and ending in fourth quarter 2016. Construction work force would peak during month 16 at approximately 1,000 workers per day and average approximately 600 workers over the course of construction. Construction of the transmission line would require fewer than 25 workers during peak periods. The construction schedule will not coincide with the peak of plant site construction employment.

A worst-case scenario, where all workers commute in autos with only one occupant per vehicle, would result in approximately 1,000 inbound trips during the morning peak period and another 1,000 outbound trips during the evening peak hour. During Month 16, the estimated construction peak, the BSPP would generate approximately 2,000 one-way worker commute trips per day.

In addition, construction is also forecast to generate an average of approximately 15 to 20 one-way, truck trips per day with a peak of approximately 50-75 truck trips per day. The peak truck travel would be during plant site foundation construction and would not coincide with the peak on-site worker commute times during Month 16.

Palen

Palen construction activities will occur over an approximate 39-month period, beginning fourth quarter 2010 and ending in fourth quarter 2013. The number of construction

workers will peak at Month 17 at approximately 1,141 per day and average approximately 566 workers over the course of construction. In addition, a transmission line extending from the project site to a new Southern California Edison substation west of the project site would require approximately 30 workers. The construction schedule of the power line is not expected to coincide with the construction of the solar facility. In addition, construction would not encroach on a public right-of-way nor coincide with peak employment.

The worst-case scenario for Palen, where all workers commute with only one occupant per vehicle, yields a peak trip generation of approximately 1,141 inbound trips during the morning peak period and another 1,141 outbound trips during the evening peak hour. Peak travel times would result in 2,282 one-way worker commute trips per day and an average of 1,132 one-way trips per day. The construction period is expected to generate an average of approximately 20 to 30 one-way, truck trips per day with a peak of approximately 40 truck trips per day.

Genesis

The 37-month construction period is expected to begin in fourth quarter 2010 and end third quarter 2014. The Project construction work force will peak during month 23 at approximately 1,093 workers per day and average approximately 652 workers over the course of construction.

Construction of the access road, transmission line, and gas line will require approximately 110 workers and would not coincide with the plant's peak construction period.

The worst-case scenario for Genesis, where all workers commute in autos with only one occupant per vehicle, yields a peak trip generation of approximately 1,093 inbound trips during the morning peak period and another 1,093 outbound trips during the evening peak hour occurring in Month 23. In addition, construction impacts will result in an average of approximately 15 to 20 one-way, truck trips per day with a peak of approximately 50 to 75 truck trips per day. Peak truck travel would occur during plant site foundation construction and would not coincide with the peak on-site worker commute time.

All Three Projects: Blythe, Palen and Genesis

In addition to using I-10 for construction traffic, each project would generate trips during operations over its own particular interchange/local intersections, as follows:

1. I-10 at Corn Springs Road, West of the Palen site

2. 1-10 at Wiley's Well Road, East and West of the Genesis project site

3. 1-10 at Mesa Drive, East of the Blythe project site

Since the Blythe, Palen and Genesis projects would have overlapping construction schedules, traffic impacts could potentially be exacerbated locally along I-10 and at the above intersections. Therefore, staff has proposed Condition of Certification **TRANS-1**

to require coordinated traffic control plans for all three projects. The Blythe and Palen projects also include this condition of certification. The traffic control plans would include incentives for carpooling, such as an employer-sponsored Commuter Check Program and staggered work schedule start times to ensure acceptable loads on I-10 are maintained throughout the projects' construction periods.

Staff has also proposed Condition of Certification **TRANS-5** to ensure repair of any roadway damage caused by construction equipment and supply delivery. The Blythe and Palen projects also include this condition.

Regional Impacts during Construction

Several proposed and existing projects shown on the **Traffic and Transportation, Figure 3** have the potential to result in increased congestion on I-10. These projects include Chuckwalla Valley State Prison, Eagle Mountain Pumping Plant; commercial projects approved by the city of Blythe; Blythe Energy Project II; Blythe Airport Solar I Project; Mule Mountain Solar Project; Big Maria Vista Solar Project; Blythe PV Project; Desert Quartzite; Desert Sunlight; Mojave Solar Park/Desert Lilly Project; McCoy Soleil; Red Bluff Substation and the Chuckwalla Valley Raceway.

Although I-10 currently operates at LOS A, the high volume of traffic resulting from the overlapping construction of the Blythe, Palen and Genesis projects could result in I-10 operating at an unacceptable LOS. In addition, the LOS on I-10 could further denigrate with the identified additional projects. As a result of all these projects, cumulative impacts are significant and the BSPP, PSPP and GSEP would mitigate their contribution to this cumulative impact through the measures outlined in Condition of Certification **TRANS- 1.** This condition of certification requires applicants of the three projects examined in this analysis to coordinate construction schedules to ensure that during overlapping construction periods traffic control measures such as staggered work schedule start times and incentives for carpooling, such as an employer-sponsored Commuter Check Program are implemented to ensure that I-10, including all intersections, operate at an acceptable LOS. Lastly, the BLM and the County of Riverside could also require similar types of mitigation to reduce the other projects contributions to the significant cumulative impacts on I-10.

Local and Regional Impacts during Operation and Decommissioning

Operation

The operation of the three proposed solar projects analyzed in this section would not significantly contribute to long-term operational cumulative impacts related to traffic and transportation. During operation years, I-10 is expected to carry low traffic volumes and operate at LOS A. The small number of operations workers for each project would not increase the traffic volumes enough to reduce operations to below LOS A.

Decommissioning

The decommissioning of the Blythe, Palen, and Genesis solar projects, which is unlikely during the next 40 years, is not expected to result in adverse cumulative traffic and transportation impacts. These three projects are not likely to be decommissioned at the

same time, and even if they were, any cumulative impacts could easily be mitigated by staggering construction employees' work schedules to ensure acceptable LOS levels. Also, construction of other solar projects is not likely to occur during the decommissioning of the Blythe, Palen, and Genesis solar projects.

Cumulative Impacts Conclusion

In this analysis, staff considered the cumulative impacts of Blythe, Palen, and Genesis, solar projects on the I-10 traffic corridor in eastern Riverside County (I-10 for approximately 170 miles beginning near Indio, California, and ending approximately 50 miles west of Blythe, California). Without mitigation, the traffic and transportation impacts of the Blythe, Palen, and Genesis solar projects have the potential to result in cumulatively considerable impacts to I-10 as well as to local streets, highways, and intersections in the vicinity of the project sites.

These cumulatively considerable impacts could also combine with impacts of past, present, or reasonably foreseeable projects to result in even greater cumulative impacts. Therefore, staff has recommended Condition of Certification **TRANS-1,** to reduce the cumulative impacts of these three projects to less than significant. However, other projects in the area are not under the scope of this analysis could result in cumulative impacts on I-10, reducing the LOS.

C.10.9 COMPLIANCE WITH LORS

The proposed GSEP is intending to comply with all federal, state, and local LORS. Development and operation of the GSEP as planned would not conflict with the LORS as described in this section. **Traffic and Transportation Table 5** summarizes the GSEP's conformance with all applicable LORS.

Traffic and Transportation Table 5
GSEP Compliance with Adopted Traffic and Transportation LORS

Applicable LORS	Description
Federal	
Title 49 Code of Federal Regulations (CFR) Subtitle B, Parts 171-173, 177-178, 350-359, 397.9 and Appendices A-G	Addresses safety considerations for the transport of goods, materials, and substances. Governs the transportation of hazardous materials including types of materials and marking of the transportation vehicles. Consistent: The GSEP will comply with these regulations. Enforcement is provided by federal enforcement agencies. Adherence is made part of the licensing process as Condition of Certification **TRANS-4**.
State	
California Vehicle Code (VC) Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620; California Health and Safety Code Section 25160 et seq.	Regulates the highway transport of hazardous materials. Consistent: The GSEP will comply with these regulations. Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting and/or local agency permitting. Adherence is made part of the licensing process as Condition of Certification **TRANS-4**.
VC Sections 13369; 15275 and 15278	Addresses the licensing of drivers and the classification of licenses required for the operation of particular types of vehicles; also requires certificates permitting operation of vehicles transporting hazardous materials. Consistent: The GSEP will comply with these regulations. Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting and/or local agency permitting. Adherence is made part of the licensing process as Conditions of Certification **TRANS-2** and **TRANS-4**.
VC Sections 35100 et seq.; Section 35250 et seq.; and Section 35400 et seq.	Specifies limits for vehicle width, height, and length. Consistent: The GSEP will comply with these regulations. Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting and/or local agency permitting. Adherence is made part of the licensing process as Condition of Certification **TRANS-2**.
VC Section 35780	Requires permits for any load exceeding Department of Transportation (Caltrans) weight, length, or width standards for public roadways. Consistent: The GSEP will comply with these regulations. Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting and/or local agency permitting. Adherence is made part of the licensing process as Condition of Certification **TRANS-2**.

Applicable LORS	Description
California Streets and Highways Code Section 117, 660-672	Requires permits for any load exceeding Department of Transportation (Caltrans) weight, length, or width standards on County roads. Consistent: The GSEP will comply with these regulations. Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting and/or local agency permitting. Adherence is made part of the licensing process as Condition of Certification **TRANS-2**.
California Streets and Highways Code Sections 117, 660-670, 1450, 1460 et seq., and 1480 et seq.	Regulates permits from Department of Transportation (Caltrans) for any roadway encroachment for facilities that require construction, maintenance, or repairs on or across State highways and County roads. Consistent: The GSEP will comply with these regulations. Enforcement is provided by state and local law enforcement agencies, and through ministerial state agency licensing and permitting and/or local agency permitting. Adherence is made part of the licensing process as Condition of Certification **TRANS-3** and **TRANS-5**.
Local	
Riverside County General Plan Circulation Element	Specifies long-term planning goals and procedures for transportation infrastructure system quality and specifies LOS standards used to assess the performance of a street or highway system and the capacity of a roadway. Consistent: The GSEP is consistent with the goals and policies of the Circulation Element. The GSEP mitigates project-related impacts through Conditions of Certification, and it incorporates transportation demand management through staggered work hours and incentives for carpooling. See **TRANS-1** and **TRANS-5**.
Riverside County Municipal Code Title 10, Chapter 10.08, Sections 10.08.010-10.08.180	Specifies limits and permit requirements for oversize loads. Consistent: The GSEP will comply with these regulations. Riverside County will provide enforcement and any necessary permitting. Adherence is made part of the licensing process as Condition of Certification **TRANS-2**.
Riverside County Municipal Code Title 12, Chapter 12.08, Sections 12.08.010-12.08.100	Specifies permit requirements for encroachment permits. Consistent: The GSEP will comply with these regulations. Riverside County will provide enforcement and any necessary permitting. Adherence is made part of the licensing process as Condition of Certification **TRANS-3**.

C.10.10 NOTEWORTHY PUBLIC BENEFITS

While the development of the proposed project is intended to address the requirements of federal and state mandates to develop renewable energy, it would not yield any noteworthy public benefits related to traffic and transportation.

C.10.11 RESPONSE TO APPLICANT COMMENTS

The following is staff's response to the Genesis Solar Energy Project (Applicant) Traffic and Transportation comments submitted by letter dated April 30, 2010. The Applicant's comments are paraphrased.

Applicant -1 Proposed Condition of Certification **TRANS-1** requires that the Applicant consult with Solar Millenium, LLC [3] to provide for a coordinated park and ride system of bus service to reduce potential stacking on I-10 and a decrease of the LOS. The Applicant does not agree that the park and ride requirement is appropriate as the three project sites would utilize different interchanges and the park and ride location would concentrate traffic in a centralized location and result in decreased LOS. The applicant has provided recommended alternatives to address potential stacking on I-10.

Response: The **Cumulative Impacts and Mitigation** section provides detailed information and reasoning for the conclusions that the GSEP would not have a considerable cumulative contribution to the transportation and traffic impacts within the area with the incorporation of a Traffic Control Plan (TCP). Staff has revised the TCP in Condition of Certification **TRANS-1** to eliminate the park and ride aspect and replaced with alternative traffic measures which are acceptable if the project owner can demonstrate that the implemented measures would ensure that Interstate 10 operates at a Level of Service (LOS) C or higher during the peak travel hours.

C.10.12 PROPOSED CONDITIONS OF CERTIFICATION

TRAFFIC CONTROL PLAN

TRANS-1 Prior to start of construction of the Genesis Solar Energy Project (GSEP) the project owner shall prepare and implement a Traffic Control Plan (TCP) for the GSEP's construction and operation traffic. The TCP shall address the movement of workers, vehicles, and materials, including arrival and departure schedules, and designated workforce and delivery routes.

The project owner shall consult with the County of Riverside and the Department of Transportation (Caltrans) District 8 office in the preparation and implementation of the Traffic Control Plan and shall submit the proposed Traffic Control Plan to the County of Riverside and the Department of Transportation (Caltrans) District 8 office in sufficient time for review and comment to the Energy Commission Compliance Project Manager (CPM) for review and approval prior to the proposed start of construction and implementation of the plan.

The project owner shall provide a copy of any written comments from the County of Riverside and the Department of Transportation (Caltrans) District 8 office and any changes to the Traffic Control Plan to the CPM prior to the proposed start of construction.

[3] Solar Mellinium LLC is the applicant for both Blythe Solar Power Project and Palen Solar Power Project.

The Traffic Control Plan shall include:

- A work schedule and end-of-shift departure plan designed to ensure that stacking does not occur on intersections necessary to enter and exit the project sites. The project owner shall consider using one or more of the following measures designed to prevent stacking: staggered work shifts; off-peak work schedules; restricting travel to and departures from each project site to 10 or fewer vehicles every three minutes during peak travel hours on Interstate 10.

  The project owner may use any of the above traffic measures or any other measures if the project owner can demonstrate that the implemented measures would ensure that Interstate 10 operates at a Level of Service (LOS) C or higher during the peak travel hours.
- Provisions for an incentive program such as an employer-sponsored Commuter Check Program to encourage construction workers to carpool and/or use van or bus service.
- Limitation on truck deliveries to the project sites to only off-peak hours to ensure adequate exit and entry at appropriate intersections.
- Provisions for redirection of construction traffic with a flag person as necessary to ensure traffic safety and minimize interruptions to non-construction related traffic flow.
- Placement of signage, lighting, and traffic control device at the project construction site and laydown areas.
- Signage along eastbound and westbound appropriate roads and at the entrance of each of the I-10 northbound and southbound off-ramps at appropriate roads notifying drivers of construction traffic throughout the duration of the construction period.
- A heavy-haul plan designed to address the transport and delivery of heavy and oversized loads requiring permits from Department of Transportation (Caltrans) or other state and federal agencies.
- Parking for workforce and construction vehicles.
- Emergency vehicle access to the project site.

Verification: At least 60 calendar days prior to the start of construction, including any grading or site remediation on the power plant site or its associated easements, the project owner shall submit the proposed traffic control plan to the County of Riverside and the Department of Transportation (Caltrans) District 8 office for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the County of Riverside and the Department of Transportation (Caltrans) District 8 office requesting review and comment.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from either the County of Riverside and

the Department of Transportation (Caltrans) District 8 office, along with any changes to the proposed traffic control plan to the CPM for review and approval.

TRANS-2 Oversized and Overweight Vehicles The project owner shall comply with limitations imposed by the Department of Transportation (Caltrans) District 8 office and other relevant jurisdictions including the County of Riverside on vehicle sizes and weights and driver licensing. In addition, the project owner or its contractor shall obtain necessary transportation permits from the Department of Transportation (Caltrans) and all relevant jurisdictions for use of roadways.

Verification: In the Monthly Compliance Reports (MCRs), the project owner shall report permits received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation on-site for Compliance Project Manager (CPM) inspection if requested.

TRANS-3 Encroachment into Public Rights-of-Way The project owner or its contractor shall comply with the Department of Transportation (Caltrans) and other relevant jurisdictions limitations for encroachment into public rights-of-way and shall obtain necessary encroachment permits from the Department of Transportation (Caltrans) and all relevant jurisdictions.

Verification: In the MCR's, the project owner shall report permits received during that reporting period. In addition, for at least six months after the start of commercial operation, the project owner shall retain copies of permits and supporting documentation on-site for CPM inspection, if requested.

TRANS-4 Securing Permits/Licenses to Transport Hazardous Materials The project owner shall ensure that permits and/or licenses are secured from the California Highway Patrol and Department of Transportation (Caltrans) for the transport of hazardous materials.

Verification: In the MCR's, the project owner shall report permits and/or licenses for hazardous substance transportation received during that reporting period. In addition, the project owner shall retain copies of permits, licenses, and supporting documentation on-site for CPM inspection if requested.

TRANS-5 Restorations of All Public Roads, Easements, and Rights-of-Way The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities to original or near-original condition in a timely manner, as directed by the CPM. Repairs and restoration of access roads may be required at any time during the construction phase of the project to assure safe ingress and egress.

Verification: At least 30 days prior to the start of mobilization, the project owner shall photograph or videotape all affected public roads, easements, and right-of-way segments and/or intersections and shall provide the CPM, the affected local jurisdictions and the Department of Transportation (if applicable) with a copy of these images. The project owner shall rebuild, repair and maintain all public roads, easements, rights-of-way in a usable condition throughout the construction phase of the project.

Prior to the start of site mobilization, the project owner shall consult with the County of Riverside and the Department of Transportation (Caltrans) District 8 and notify them of the proposed schedule for project construction. The purpose of this notification is to request that the County of Riverside and the Department of Transportation (Caltrans) consider postponement of public right-of-way repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner regarding any concurrent construction-related activities that are planned or in progress and cannot be postponed.

Within 60 calendar days after completion of construction, the project owner shall meet with the CPM, the County of Riverside and Department of Transportation (Caltrans) District 8 to identify sections of public right-of-way to be repaired. At that time, the project owner shall establish a schedule to complete the repairs and to receive approval for the action(s). Following completion of any public right-of-way repairs, the project owner shall provide a letter signed by the County of Riverside and the Department of Transportation (Caltrans) District 8 stating their satisfaction with the repairs to the CPM.

C.10.13 CONCLUSIONS

1. The GSEP as proposed with conditions of certification would comply with all applicable LORS related to traffic and transportation. As a result, it would result in less than significant impacts to the traffic and transportation system.

2. Based on the GSEP's distance from the nearest airport, no impact on the Blythe Airport or Desert Center Airport would occur, and the project would not impact aviation safety.

3. Based on the GSEP's distance from the nearest rail and bus service, the project would not have an impact on these forms of transportation.

4. The GSEP as proposed with conditions of certification would not result in significant direct, indirect or cumulative traffic and transportation impacts, and therefore, no environmental justice issues.

5. Staff is proposing Condition of Certification **TRANS-1,** which requires the owner to develop and implement a Traffic Control Plan. The Traffic Control Plan would include a plan for reducing peak construction workforce vehicle trips.

6. Staff is proposing Condition of Certification **TRANS- 2,** limitation of vehicle size and weights to ensure compliance with limitations on use on roadways.

7. Staff is proposing Condition of Certification **TRANS- 3** requiring compliance with limitations on encroachment into public rights-of-ways.

8. Staff is proposing Condition of Certification **TRANS- 4** to ensure safe transport of hazardous materials.

9. Staff is proposing Condition of Certification **TRANS-5** to ensure all public roads, easements and rights-of-ways are restored to their original condition if damaged by project related construction.

C.10.14 REFERENCES

BLM 2010 - California Desert Conservation Area Plan 1980, accessed January, 2010 http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/cdd/cdcaplan.Par.15259.File.dat/CA_Desert_.pdf

BLM 2010- The Northern and Eastern Colorado Desert Coordinated Management, December 19, 2002 Plan accessed January, 2010 http://www.blm.gov/ca/st/en/fo/cdd/neco.html

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CEC 2010g—California Energy Commission/M. Monasmith (tn: 56669) ROC regarding spur road/secondary access. 5/12/2010

CFR 2010 Code of Federal Regulations, Title 49 Regulations relating to Transportation

CVC 2010 California Vehicle Code

California Code 2010 Streets and Highways

County of Riverside. Circulation Element of the General Plan. 1993.

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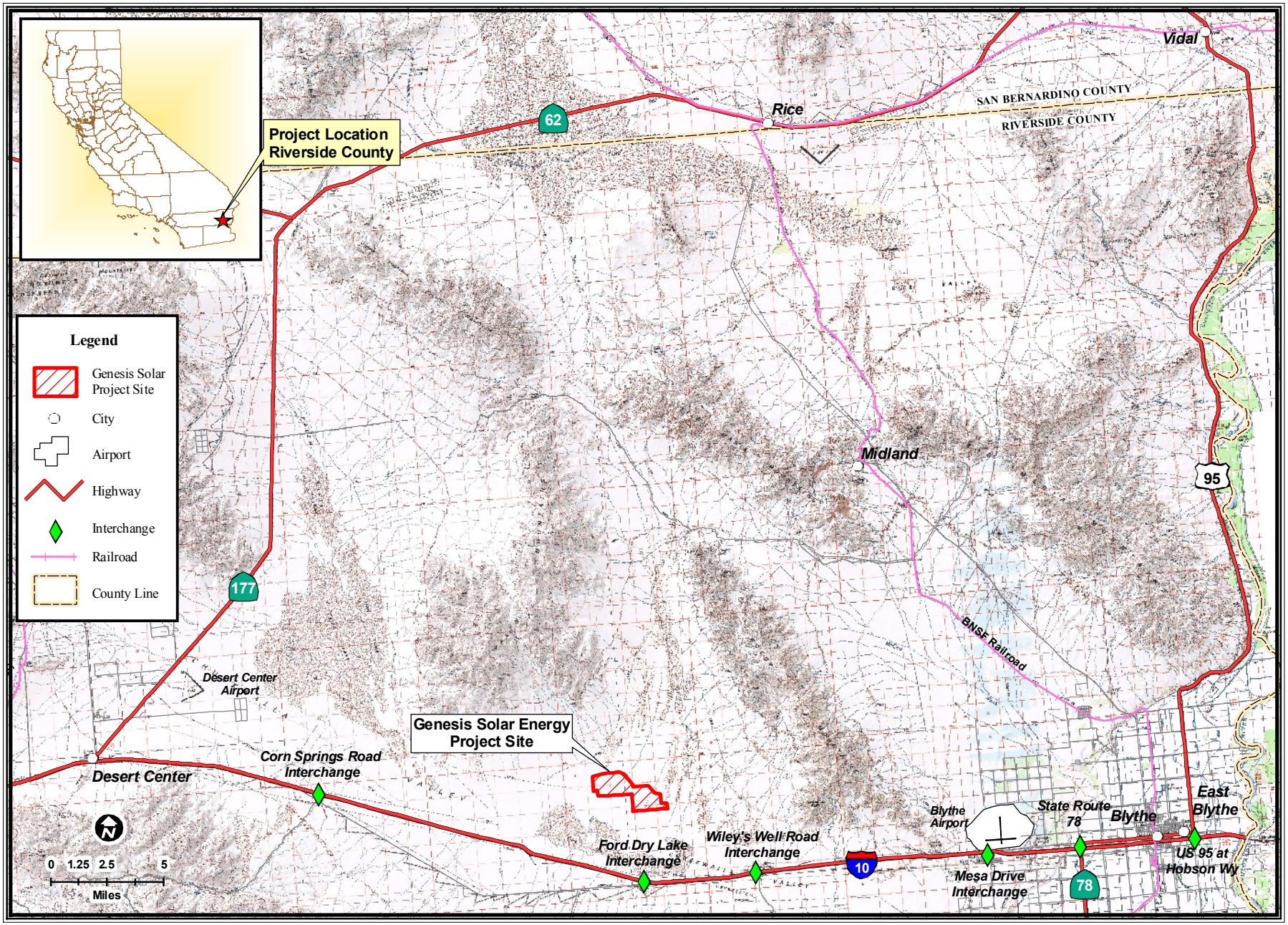
GSEP 2009 – Genesis Solar Energy Project/T. Bernhardt (tn: 53083) Application for Certification for the Genesis Solar Energy Project. 08/31/2009

TTEC 2010n – Tetra Tech/T. Bernhardt (tn: 56505) Applicant's Proposed Conditions of Certification in other areas. 4/29/2010

TRAFFIC AND TRANSPORTATION - FIGURE 1

Genesis Solar Energy Project - Regional Transportation Network

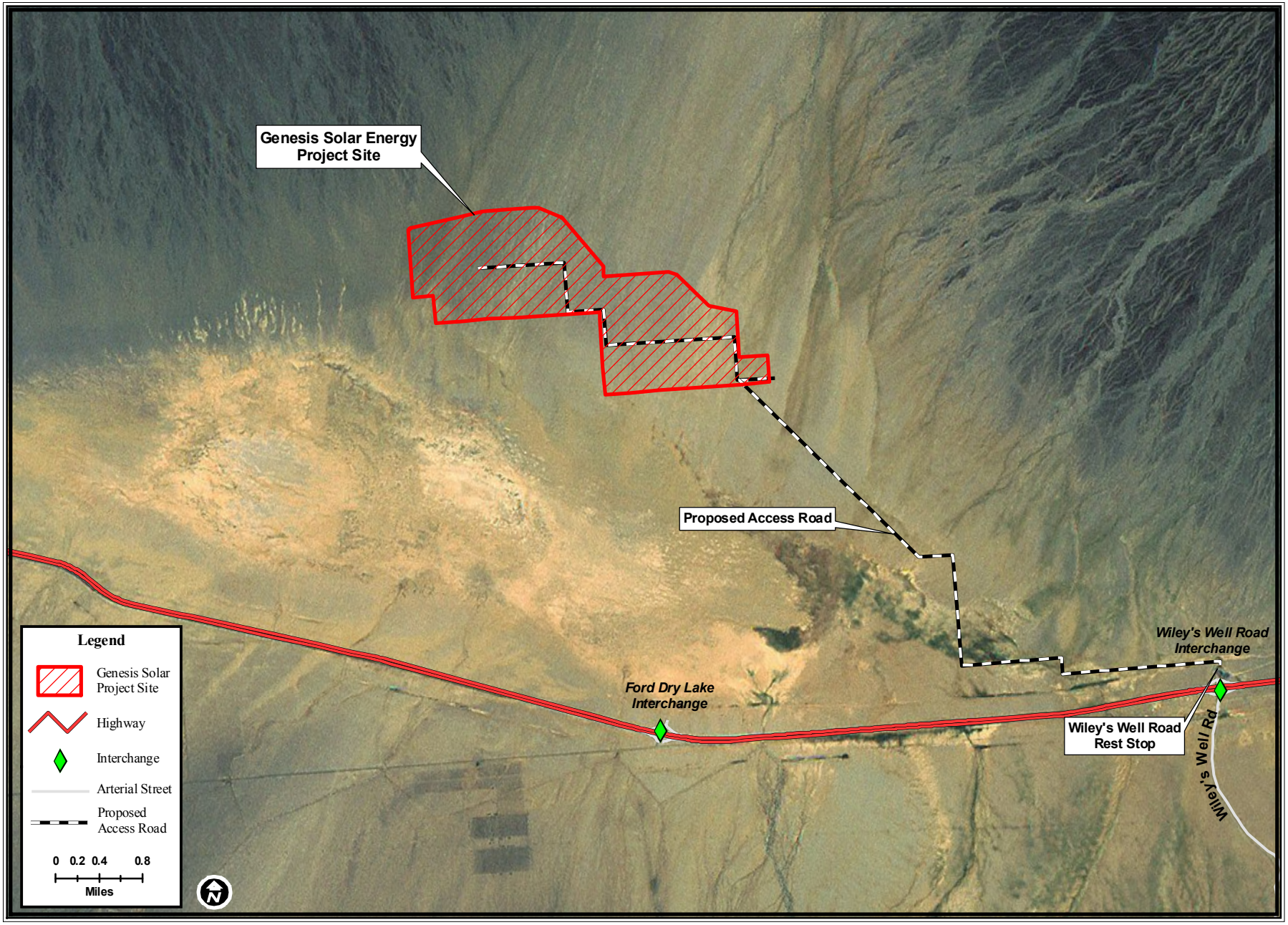


CALIFORNIA ENERGY COMMISSION - SITING,TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: California Energy Commission Statewide Power Plant Maps 2010 - Tele Atlas

TRAFFIC AND TRANSPORTATION - FIGURE 2

Genesis Solar Energy Project - Local Transportation Network

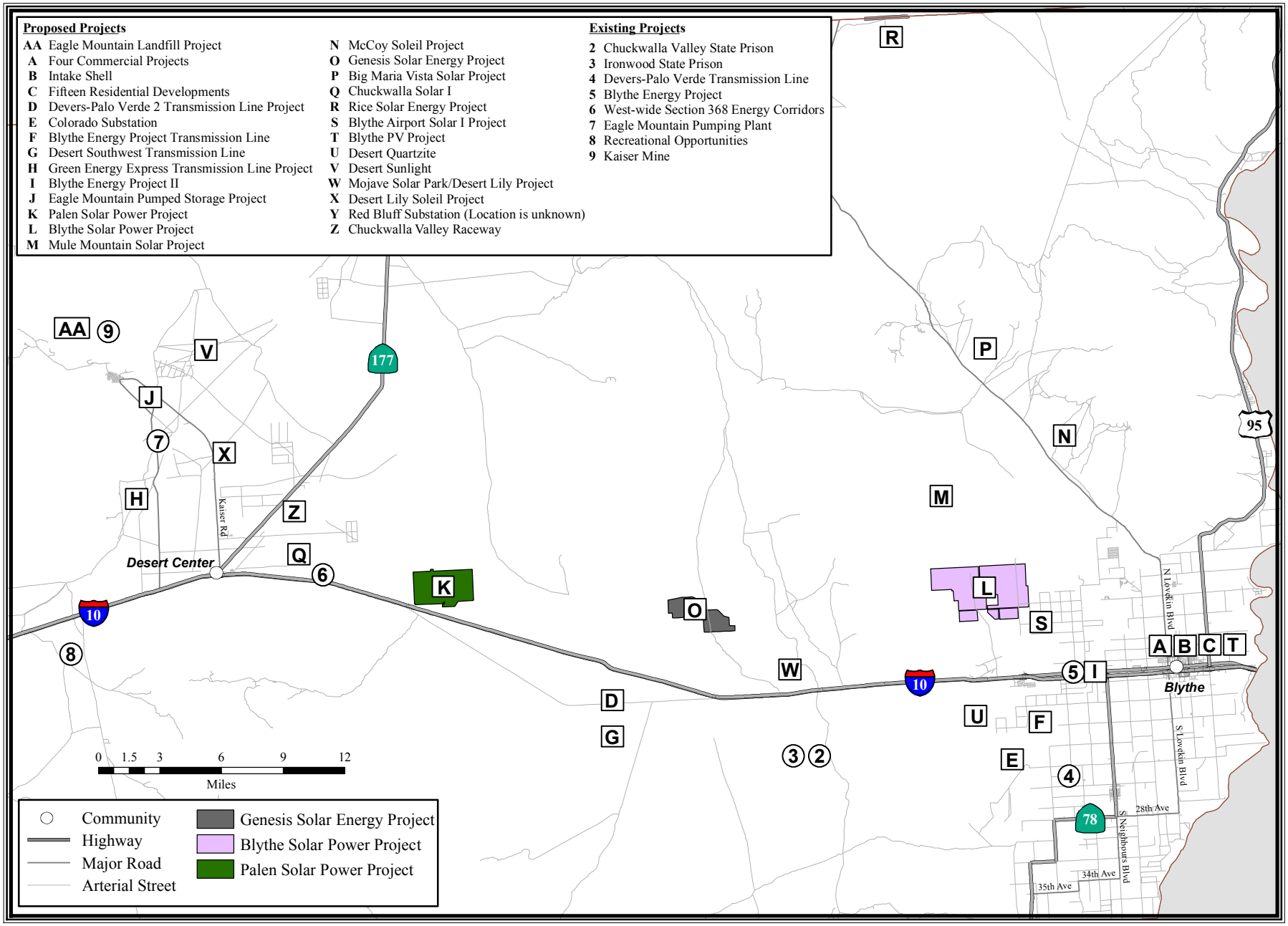


CALIFORNIA ENERGY COMMISSION - SITING,TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: California Energy Commission Statewide Power Plant Maps 2010 - Tele Atlas

TRAFFIC & TRANSPORTATION - FIGURE 3

I-10 Corridor Existing and Proposed Projects



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: California Energy Commission, Bureau of Land Management

C.11 - TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

C.11.1 SUMMARY OF CONCLUSIONS

The applicant, Genesis Solar, LLC proposes to transmit the power from the proposed Genesis Solar Energy Project (GSEP) to the Southern California Edison's (SCE's) transmission grid through SCE's proposed Colorado River Substation at a location approximately 6.5 miles east of the site. The project's tie-in line would be a single-circuit 230-kilovolt (kV) transmission line routed in a southerly right-of-way eventually connecting to the proposed SCE Colorado River Substation. This proposed substation would be under the jurisdiction of the California Public Utilities Commission (PUC) and the Bureau of Land management (BLM), therefore, this staff analysis is for the tie-in project line as it stretches from the proposed on-site substation to the proposed SCE substation. Since the proposed line would be located in the SCE service area, it would be constructed, operated, and maintained according to SCE's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards (LORS). The proposed route would traverse undisturbed desert land with no nearby residents, thereby eliminating the potential for residential electric and magnetic field exposures when the line is operating. With the four proposed conditions of certification, any safety and nuisance impacts from energizing the proposed tie-in line would be less than significant.

C.11.2 INTRODUCTION

The purpose of this staff assessment is to assess the proposed Genesis Solar Energy Project's (GSEP's) transmission line's design and operational plan to determine whether its related field and nonfield impacts would constitute a significant environmental hazard in the areas around the proposed route as it runs between the site and the Southern California Edison's (SCE's) planned Colorado River Substation 6.5 miles to the east. GSEP would consist of two generating units (Units 1 and Unit 2), each of 125 megawatts (MW) for a total of 250 megawatts. The generated power would be transmitted using an overhead single-circuit 230-kilovolt (kV) line. The SCE substation would be built by SCE under the jurisdiction of the California Public utilities Commission (PUC) and the Bureau of Land Management (BLM). Therefore, this staff analysis is for the proposed GSEP tie-in line and the related on-site 230-kV switchyard and not the proposed Colorado River Substation. Since the proposed line would be built and operated within the SCE service area, it would be designed, built, and operated according to SCE's guidelines. The potential impacts of concern in this analysis are those to be encountered along the proposed route. All related health and safety laws, ordinances, regulations, and standards (LORS) are currently aimed at minimizing such impacts along any given corridor. Staff's analysis in this regard focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;

- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and
- electric and magnetic field (EMF) exposure.

Section C.11.3 shows the federal, state, and local laws and policies that apply to the control of the field and nonfield impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

C.11.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

Laws, Ordinances, Regulations, and Standards

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) TABLE 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" form (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.

Applicable LORS	Description
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
Riverside County General Plan, Noise Element	Establishes policies and programs to ensure that noise levels are appropriate to land uses.
Riverside County Noise Ordinance	Establishes performance standards for planned residential or other noise-sensitive land uses.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
Title 8, California Code of Regulations (CCR) section 2700 et seq. "High Voltage Safety Orders"	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC "Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California"	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250-1258, "Fire Prevention Standards for Electric Utilities"	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

C.11.4 PROPOSED PROJECT

C.11.4.1 SETTING AND EXISTING CONDITIONS

As discussed by the applicant, Genesis Solar LLC, the two units of the proposed Genesis Solar Energy Project would occupy approximately 1,800 acres of federal land currently managed by the Bureau of Land Management (BLM). An additional 90 acres would be required for the right-of-way of the project's transmission line. The applicant proposes to obtain a total of 4,600 acres to constitute the total right-of-way for the project and all related facilities. The site is desert land located in east Riverside County approximately 25 miles west of Blythe and 27 miles east of Desert Center (GSEP 2009a pp.3-1 and 3-25). As more fully discussed by the applicant, each of the two proposed units would have its own solar field with the generated power transmitted to the SCE power grid from a common switchyard using a single-circuit overhead, 230 -kV line. The point of connection with the SCE grid would be SCE's planned 500/230-kV Colorado River Substation approximately 6.5 miles east of the site. Since the planned SCE Colorado Substation would be under the jurisdiction of the CPUC, it would be designed, built, and operated to reflect implementation of related CPUC requirements.

The proposed project site is in an uninhabited open desert land with no existing structures. The proposed line's right-of-way would traverse BLM-administered land in a largely uninhabited desert land where there is no residential area within 15 miles (GSEP 2009 p. 4-4). The general absence of residences in the area around the proposed GSEP and related transmission line means that there would not be the type of residential field exposure that has been of health concern in recent years.

PROJECT DESCRIPTION

The proposed GSEP 230-kV tie-in line would consist of the following individual segments:

- A new, single-circuit 230-kV overhead transmission line extending the 6.5 miles from the on-site project switchyard to the planned SCE Colorado River Substation to the east;
- The project's on-site 230-kV switchyard from which the conductors would extend to the planned Colorado River Substation; and
- Project-related upgrades at the Colorado River Substation.

The line would exit the facility in a southeast direction to a point where it would cross the existing Imperial County District's Blythe to Eagle Mountain 161-KV transmission line and then I-10. From the I-10 crossing, the line would further extend east and share transmission poles with the Blythe Energy Project Transmission Line (still under construction directly south of the project). From there the line would extend eastwards to ultimately terminate at the interconnection point within the planned Colorado River Substation (GSEP 2009a, p 3-25 through 3-37).

The proposed line conductors would be aluminum steel-reinforced cables supported on steel mono-pole structures placed approximately 880 feet apart and with heights of from

70 feet to a maximum of 145 feet as typical of similar SCE lines). The applicant provided the details of the proposed support structures as related to line safety, maintainability, and field reduction efficiency (GSEP 2009a, Figures 3.6-2, 3-26, and 4.2-1).

C.11.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION METHODS

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements listed on **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. These regulations require FAA notification in cases of structures over 200 feet from the ground. Notification is also required if the structure is to be below 200 feet in height but would be located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet.

The nearest airport to the project and related line is the Blythe Airport approximately 15 miles east of the project and 10 miles east of the proposed tie-in line meaning that the airport would be too far away for the project to pose a collision hazard to area aviation according to FAA criteria. Furthermore, the line support structures would, at less than 145 feet would be significantly less than the 200 feet in height that triggers the FAA concern over collision hazards. Therefore, staff does not recommend any related condition of certification.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the

magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line away from inhabited areas.

The proposed project line would be built and maintained in keeping with standard SCE practices that minimize surface irregularities and discontinuities and related corona noise. Such corona effects would further be minimized by the specific low-corona designs proposed by the applicants. Since the line would traverse an uninhabited open space, staff does not expect any corona-related radio-frequency interference or related complaints and does not recommend any related condition of certification.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception could be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, mainly from overhead lines of 345 kV or higher such as the proposed line. Research by the Electric Power Research Institute (EPRI 1982) has validated the efficacy of available mitigation measures by showing that the fair-weather audible noise from all modern transmission lines even of more than 345 kV would be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the proposed low-corona design is also aimed against surface electric fields, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff's analysis in the **Noise and Vibration** section.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SCE lines would be implemented for the proposed project line GSEP 2009a, p. 4-7). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Condition of Certification **TLSN-3** is recommended to ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (GSEP 2009a, pp. 3-25 and 4-7) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (GSEP 2009a, p.4-7). Staff recommends Condition of Certification **TLSN-4** to ensure such grounding for BSPP.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields

from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State's Approach to Regulating Field Exposures

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas.

The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or

measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new and upgraded lines in California be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

Industry's and Applicant's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line's design to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since the route of the proposed project line would have no nearby residences, the long-term residential field exposures at the root of the health concern of recent years would not be a significant concern for the line. The field strengths of most significance in this regard would be as encountered at the edge of the line's 100-foot right-of-way. These field intensities would reflect the effectiveness of the applied field-reducing measures.

The applicant (GSEP 2009a, p. 4-6 and Figures 4.22 through 5.25) calculated the maximum electric and magnetic field intensities expected for the edge of the 100-foot right-of- way. Staff has verified the accuracy of the modeling approach used in the applicant's calculations with regard to parameters bearing on field strength dissipation and exposure assessment. The maximum electric field intensity at this location was calculated as 0.7 kV/m, which reflects the effectiveness of the applied field-reducing design.

The corresponding magnetic field value was calculated as 32 mG. These field strengths are as staff would expect for an SCE line of the same voltage and current-carting capacity and reflect effective implementation of related SCE's field reduction measures. The corresponding magnetic field intensity was calculated as 143 mG at the edge of this right-of-way and is also similar to that of SCE lines of similar voltage rating and current-carrying capacity as required under current CPUC regulation. The requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to validate the applicant's assumed reduction efficiency.

CLOSURE AND DECOMMISSIONING IMPACTS AND MITIGATION

If the proposed GSEP were to be closed, decommissioned and all related structures are removed as described in the **Project Description** section, the minimal area aviation risk and electric shocks and fire hazards from the physical presence of this tie-in line would be eliminated. Decommissioning and removal would also eliminate the line's field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure. Since the line would be designed and operated according existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

C.11.5 REDUCED ACREAGE ALTERNATIVE

The reduced acreage alternative would essentially be Unit 1 of the proposed project which would be a 125 MW solar facility located within the boundaries of the proposed project. This alternative is analyzed for two main reasons: First it would eliminate about 50 percent of the proposed project area so all impacts would be reduced proportionately and second, it would retain the eastern solar field, which is located on flowing desert washes. It would also reduce impacts on the sand dune and playa areas and the Mojave Fringe-toed Lizard habitat. The alternative would also reduce impacts on wildlife movement by reducing obstruction of the Palen Wash and would maintain the dune and sandy habitats through both fluvial and Aolian processes. The boundaries of the Reduced Acreage Alternative are shown in **Figure 1** in the **Alternatives** section.

For this Reduced Acreage Alternative, the generated power would still be transmitted to the SCE power grid through the Colorado River Substation and would require infrastructure similar to that for the proposed version, including a water supply pipeline, transmission line. No downstream line upgrades would likely be necessary.

C.11.5.1 SETTING AND EXISTING CONDITIONS

This alternative would be located entirely within the boundaries of the proposed project. Its use would simply eliminate the projects impacts on the eastern 125 MW solar field and cause relocation of the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting would consist of the western portion of the proposed project as well as the area potentially affected by the linear facilities.

C.11.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff's analysis focuses on the transmission line required to serve the generation facility, and addresses the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

aviation safety;

interference with radio-frequency communication;

audible noise;

fire hazards;

hazardous shocks;

nuisance shocks; and

electric and magnetic field (EMF) exposure.

The transmission line for the Reduced Acreage alternative would follow the same route as that for the proposed project. The line would (a) be constructed, operated, and maintained according to SCE's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards and (b) would traverse undisturbed desert land with no nearby residents, thereby eliminating the potential for residential noise electric and magnetic field exposures.

C.11.5.3 CEQA LEVEL OF SIGNIFICANCE

With the four conditions of certification recommended for the proposed project, any safety and nuisance impacts from the line for the Reduced Acreage Alternative would be less than significant.

C.11.6 DRY COOLING ALTERNATIVE

The project is proposed to use a wet cooling tower for plant cooling and would utilize groundwater from wells at the site for this purpose. The Dry Cooling Alternative would preclude the use of such cooling water as cooling would be achieved without water.

C.11.6.1 SETTING AND EXISTING CONDITIONS

The setting for the Dry Cooling Alternative would be the same as described for the project and associated linear facilities as described in Subsection C.8.4.1 above. The only substantive change would be the substitution of a dry cooling facility for the proposed cooling tower to produce the same amount of power.

C.11.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff's analysis focuses on the transmission line required to serve the generation facility, and addresses the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

aviation safety;

interference with radio-frequency communication;

audible noise;

fire hazards;

hazardous shocks;

nuisance shocks; and

electric and magnetic field (EMF) exposure.

Since the same amount of power would be generated as with the proposed project, the same transmission infrastructure would be used for this Dry Cooling Alternative. The line would also (a) be constructed, operated, and maintained according to SCE's guidelines for line safety and field management which conform to applicable laws, ordinances, regulations and standards and (b) would traverse undisturbed desert land with no nearby residents, thereby eliminating the potential for residential noise and electric and magnetic field exposures.

C.11.6.3 CEQA LEVEL OF SIGNIFICANCE

With the four conditions of certification recommended for the proposed project, any safety and nuisance impacts from the line for the proposed Western Lands #2 Alternative would be less than significant.

C.11.7 NO ACTION ALTERNATIVE

With the No Project/No Action Alternative, the proposed action would not be undertaken. Unless BLM implements an amendment to the CDCA Plan, 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.

C.11.7.1 SETTING AND EXISTING CONDITIONS

The setting for the No Project/No Action Alternative would include lands in which the proposed project and its associated linear facilities would be located. Subsection C.8.4.1 (above) describes in detail the lands that would be affected.

C.11.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

In 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. For example, there are seven large solar projects proposed on BLM land within the area served by the BLM Palm Springs South Coast Field Office, and there are currently 70 applications for solar projects covering 611,692 acres pending with BLM in the California Desert District.

Under the No Project/No Action alternative, the transmission line safety and nuisance impacts of the proposed GSEP would not occur at the proposed site. This would help reduce the total human exposure to area field and non-field impacts from electric power lines in general.

C.11.7.3 CEQA LEVEL OF SIGNIFICANCE

Under the No Project/No Action alternative, the transmission line safety and nuisance impacts from the proposed project line would not occur thereby contributing to the general effort to reduce these impacts on humans. However, given the potentially low levels of these line impacts, such contribution to exposure reduction would be less than significant.

C.11.8 CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (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).

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since the proposed project's transmission line would be designed, built, and operated according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**.

C.11.9 COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in this case is SCE. Since the proposed project 230-kV line and related switchyard would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-2**.

C.11.10 NOTEWORTHY PUBLIC BENEFITS

Since the proposed BSPP tie-in line would pose specific, ant risks of the field and nonfield effects of concern in this analysis, its building and operation would not yield any public benefits regarding the effort to minimize any human risks from these impacts.

C.11.11 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

TLSN-1 The project owner shall construct the proposed transmission line according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2. High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF reduction guidelines.

Verification: At least 30 days before starting the transmission line or related structures and facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates.

The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than 6 months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the rights-of-way of the proposed transmission line are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the right-of-way of the project-related lines are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

C.11.12 CONCLUSIONS

Since staff does not expect the proposed 230-kV transmission line to pose a significant aviation hazard according to current FAA criteria, we do not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed GSEP and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed line's design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of

health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a significant human health hazard.

Since the proposed project line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be routed through an area with no nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable LORS. With implementation of the four recommended conditions of certification, any such impacts would be less than significant.

C.11.13 REFERENCES

EPRI — Electric Power Research Institute,1982. Transmission Line Reference Book: 345 kV and Above.

Genesis Solar Energy Project, 2009a, (tn:53083). Application for Certification of the Genesis Solar Energy Project, Volumes I and II. Submitted to the California Energy Commission on August 31, 2009.

National Institute of Environmental Health Services. 1998. *An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*. A Working Group Report, August 1998.

C.12 - VISUAL RESOURCES

Testimony of William Kanemoto, James Jewell, and William Walters

C.12.1 SUMMARY OF CONCLUSIONS

Energy Commission staff (hereafter referred to as staff) have analyzed visual resource-related information pertaining to the proposed Genesis Solar Project and conclude that the proposed project, with all staff-recommended conditions of certification, would have adverse, but less-than-significant visual impacts.

Impacts of the Reduced Acreage Alternative, with staff-recommended conditions of certification, would also have less-than-significant visual impacts. However, the degree and extent of those impacts would be substantially less than those of the Proposed Project.

Impacts of the Dry Cooling Alternative, with staff-recommended conditions of certification, would be substantially similar to the Proposed Project and would also have less-than-significant visual impacts. The Dry Cooling Alternative could be somewhat superior to the Proposed Project due to a lower incidence of visible vapor plumes.

However, the anticipated visual impacts of the Proposed Project, Reduced Acreage, and Dry Cooling Alternatives, in combination with past and foreseeable future local projects in the Chuckwalla Valley, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively significant and unmitigable.

All action alternatives studied, with staff-recommended conditions of certification, would conform with all applicable Laws, Ordinances, Regulations and Standards (LORS).

C.12.2 INTRODUCTION

The following analysis evaluates potential visual impacts of the Genesis Solar Project; its consistency with applicable Laws, Ordinances, Regulations and Standards (LORS); and conformance with applicable guidelines of the California Environmental Quality Act (CEQA).

In order to provide a consistent framework for the analysis, a standard visual assessment methodology developed by California Energy Commission staff and applied to numerous siting cases in the past was employed in this study. A description of this methodology is provided in **Appendix VR-1.** The analysis was also based upon a visual resource inventory and Interim Visual Resource Management Class mapping of the area prepared for the Devers-Palo Verde No. 2 Transmission Line EIR/EIS, and is consistent with that inventory.

As noted above, the project is evaluated for conformance with applicable LORS. Adopted expressions of local public policy pertaining to visual resources are also given great weight in determining levels of viewer concern. In accordance with staff's

procedure, conditions of certification are proposed as needed to reduce potentially significant impacts to less than significant levels, and to ensure LORS conformance, if feasible.

C.12.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Federal

The National Environmental Policy Act (NEPA) requires that the federal government use 'all practicable means to ensure all Americans safe, healthful, productive, and *aesthetically* (emphasis added) and culturally pleasing surroundings (42 U.S. Code 4331[b][2]).'

Significance under NEPA is defined in terms of a) context and b) intensity. Context means that the significance of an action must be analyzed in several contexts, such as society, the affected region, affected interests, and locale. Intensity refers to the severity of impact, and includes a variety of factors to be considered (40 CFR 1508.27).

Some of the intensity factors cited in 40 CFR 1508.27 that are potentially relevant to visual impacts include 'unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands . . . ,' degree of controversy, degree of uncertainty about possible effects, degree to which an action may establish a precedent for future actions, and potential for cumulatively significant impacts.

In this study, staff utilized visual resource inventory and Interim Visual Resource Management Class assignments conducted for BLM for the Devers-Palo Verde 2 Transmission Line EIR/EIS, as a part of the environmental baseline for this analysis, as described in greater detail in Section C.12.4.1, below (CPUC/USDOI, 2006). The analysis of this staff assessment does not apply the BLM Visual Resource Management (VRM) system. In staff's professional opinion, however, despite differences in application and process, the fundamental visual assessment principles used in the BLM and CEC methodologies are consistent with one another, and BLM has consequently agreed to assess the visual effects of the project using the CEC method. Staff thus considers that the conclusions of this analysis are substantially equivalent to those that would be reached by applying BLM-specific methods of visual assessment, although the large-scale land management orientation of the VRM system differs in application from the CEQA-oriented CEC approach in some ways.

State

The CEQA *Guidelines* define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance." (Cal. Code Regs., tit.14, § 15382.) Appendix G of the *Guidelines*, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

a. Would the project have a substantial adverse effect on a scenic vista?

b. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

c. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

d. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

In addition, staff evaluates potential impacts in relation to standard criteria described in detail in Appendix VR-1. Staff evaluates both the existing visible physical environmental setting, and the anticipated visual change introduced by the proposed project to the view, from representative, fixed vantage points (called “Key Observation Points” (KOPs). KOPs are selected to be representative of the most characteristic and most critical viewing groups and locations from which the project would be seen.

The likelihood of a visual impact exceeding Criterion C. of the CEQA Guidelines, above, is determined in this study by two fundamental factors: the susceptibility of the setting to impact as a result of its existing characteristics (reflected in its current level of visual quality, the potential visibility of the project, and the sensitivity to scenic values of its viewers); and the degree of visual change anticipated as a result of the project. These two factors are summarized respectively as *visual sensitivity* (of the setting and viewers), and *visual change* (due to the project) in the discussions below. Briefly, KOPs with high sensitivity (due to outstanding scenic quality, high levels of viewer concern, etc.), that experience high levels of visual change from a project, are more likely to experience adverse impacts.

Under the Energy Commission criteria, as under all professionally accepted visual assessment methods, visibility of a project per se does not constitute a threshold for significant visual impact, regardless of the sensitivity of viewers, except under unusual circumstances in which applicable legal restrictions apply. For example, within a national park or BLM Wilderness Area, very low levels of visibility of a project may be considered the appropriate significant visual impact threshold. However, this threshold would apply only to actions within the park or wilderness boundaries.

Local

Staff also reviews local LORS and their policies or guidelines for aesthetics or preservation and protection of sensitive visual resources that may be applicable to the project site and surrounding area. These LORS include local government land use planning documents where applicable.

Please refer to **Appendix VR-1** for a complete description of staff’s visual resources evaluation criteria.

C.12.4 PROPOSED PROJECT

C.12.4.1 SETTING AND EXISTING CONDITIONS

Regional Landscape

The Project is located within the Mojave Desert, a sub-region of the Sonoran Desert. The Mojave is bordered to the south (at I-10) by the hotter Colorado Desert (also a sub-region of the Sonoran Desert) and to the north (near the Sierra Nevada Mountains) by the colder Basin and Range Desert.

The Mojave Desert is a landscape typical of the basin and range physiographic province of which it is part, with small, rocky mountain ranges with jagged peaks alternating with talus slopes and desert floor. Flat basins form broad flat expanses of barren plains typified by low scrub vegetation and expansive views. Dark browns and garnets are the dominant mountain hues, although blues and purples prevail as viewing distance increases. In contrast, lighter brown and tan soils dominate the desert floor, sparsely dotted with the grey-green of Sonoran creosote bush and golden bursage scrub vegetation. Although Joshua Tree National Park is located to the west of the project vicinity, there are no Joshua Trees in the project viewshed. However, desert Ironwood (*Olneya tesota*), a tree species unique to portions of the Sonoran Desert known for its occasional colorful pink bloom, are evident in the project area, and outstanding concentrations of Ironwood forest are located among washes north of the project site (ASDM 2010).

The Project site is located in the center of the Chuckwalla Valley, a northwest-southeast trending valley, roughly 40 miles long and 5 to 10 miles wide. Valley elevations range from 350 feet at Ford Dry Lake just south of the Project site to about 800 feet. The small surrounding mountain ranges rise 3,000 to 5,000 feet above mean sea level (amsl): McCoy Mountains to the east, Palen Mountains to the north, Mule Mountains to the southeast, Little Chuckwalla Mountains to the south, and Chuckwalla Mountains to the southwest. Like the Mojave desert in general, the Chuckwalla Valley is a highly visible landscape, affording wide, panoramic views of long duration and depth. Flat desert plains combine with sparse vegetation to allow distant views of mountain ranges that form a backdrop.

There are no residences within 15 miles of the Project site. The nearest communities are Lake Tamarisk and Desert Center, over 20 miles to the west, and Blythe, over 20 miles to the east. None of these communities have views of the Project site due to distance and topography.

The BLM manages several congressionally designated wilderness areas near the project site: the Palen/McCoy Wilderness Area abuts the northern site boundary; the Little Chuckwalla Wilderness Area is six to twelve miles to the southeast; and the Chuckwalla Wilderness Area is about five miles to the southwest. Other special designation areas in the area include several Areas of Critical Environmental Concern (ACECs). The Palen Dry Lake ACEC lies roughly 5 miles to the west. The Desert Lily Sanctuary ACEC is located off of Route 177 northeast of Desert Center. The eastern boundary of Joshua Trees National Monument is also located just west of Route 177.

Use of Ford Dry Lake directly south of the project site is limited to travel on designated routes; there are no camping facilities and no off-road travel allowed. There is an undeveloped camping area at the end of Corn Springs Road adjacent to the Chuckwalla Wilderness, approximately 18 miles southwest of the Project. There are no facilities or designated trails within the Palen-McCoy Wilderness, although hiking access is possible via old, closed jeep trails.

There is limited existing development in the vicinity of the site: I-10, roughly two miles south of the Project site, is the dominant man-made feature. Other developments include Chuckwalla Valley State Prison and Ironwood State Prison, 2-1/2 miles south of I-10 off of Wiley's Well Road. Both are roughly nine miles southeast of the Project and are visible but visually very subordinate from I-10. Approximately one to three miles to the south of I-10, there are Western Area Power Administration (WAPA) and Southern California Edison (SCE) transmission lines and substations within BLM's Utility Corridor K (GSEP 2009a). The Devers-Palo Verde transmission line runs east to west roughly one to 3 miles south of the highway but remains largely visually subordinate from the highway within most of the Chuckwalla Valley. Despite these man-made features the natural setting predominates and the existing landscape of the Chuckwalla Valley appears relatively intact, dominated by vast expanses of dry lake and scrub-covered valley floor, and vivid mountains behind them.

Project Site

VISUAL RESOURCES Figure 1, View of the Project Site, depicts a panoramic view of the Genesis project site and vicinity looking northward from the Ford Dry Lake Road interchange on I-10. The site is located behind the lighter-colored dry lakebed in the foreground, and below the sloping alluvial fans at the foot of the mountains. The Palen Mountains appear to the left of the photograph, the McCoy Mountains appear to the right.

The 1,800 acre project site consists of two separate solar fields that span roughly 3.2 miles of the northeastern Chuckwalla Valley. The site is flat undeveloped desert abutting allluvial fans from the Palen and McCoy Mountains. The Project site is relatively flat, sloping north to south from roughly 360 to 390 feet with an overall existing slope of approximately 0.5%. The Project transmission line would also traverse flat undeveloped land before connecting to the Blythe Energy Project Transmission Line (BEPT) currently under construction in the BLM Utility Corridor K, two miles south of I-10.

The Project site and transmission line corridor are located on Federal lands administered by the BLM for Multiple Use Class (MUC) M (Moderate Use) which allows for uses such as mining, livestock, grazing, recreation, utilities and energy development, provided desert resources are conserved and impacts from such uses are mitigated. The Project transmission line would connect with the Blythe Energy Transmission Line that is under construction within the BLM's Utility Corridor K.

Project Visual Setting: Viewshed, Landscape Units, and KOPs

Project Viewshed

As illustrated in **VISUAL RESOURCES Figure 2**, which includes a computer-generated GIS viewshed map, the project would be visible to virtually all of the area within a 5-mile radius, and potentially visible to much of the area within a ten-mile radius, though mediated by distance. A characteristic feature of this desert landscape is the potential for large projects to be seen over great distances where even slightly elevated viewpoints exist, due to the large open areas of level topography and absence of intervening landscape features. Nearly all of the viewshed visible to the north of the project site lies within the Palen-McCoy Wilderness Area, which borders the site immediately to the north. However, the flatness of the project site and the level elevation relationships between the project, I-10, and low-lying viewpoints within the wilderness area, result in very oblique vertical viewing angles that reduce the prominence of the site from these viewpoints. Only from elevated viewpoints would viewers be exposed to large expanses of the site. As indicated in the viewshed mapping, however, only a very small portion of these elevated viewpoints lie within a 5-mile middle-ground radius of the project, reducing its potential visual magnitude and dominance due to distance.

Landscape Units and KOPs: Visual Quality, Viewer Concern, and Viewer Exposure

VISUAL RESOURCES Figure 2, Existing Landscape Setting, Project Viewshed, and Key Observation Points (KOPs), subdivides the project viewshed into broad landscape units delineating areas of broadly consistent scenic quality, viewer sensitivity, and distance zone (from viewers) as previously adopted by BLM. It also depicts Key Observation Points (KOPs) used as the basis for this analysis. KOPs are used in the Energy Commission visual analysis method as the basis for evaluating potential project impacts, and represent the key sensitive viewer groups and viewing locations likely to be affected by the project. This use of KOPs is analogous to their use in the VRM method, in which KOPs are used from which to conduct contrast ratings for impact evaluation. **VISUAL RESOURCES Figure 3,** Visual Setting Character Photos, depicts various typical image types and features within the project viewshed.

In the CEC assessment approach, KOPs are rated according to the visual quality of their setting, and an assessment of their level of viewer concern and viewer exposure. Those three primary attributes are summarized in a KOP's *overall visual sensitivity* rating, which reflects an assessment of the overall susceptibility to visual impact of the viewer group/receptors it represents. These sensitivity ratings serve as the environmental baseline against which potential project impacts, measured in terms of level of *visual change*, are evaluated. Because viewer concern and exposure may vary among different receptors within a landscape unit, overall sensitivity of particular KOPs within a unit may also vary.

The baseline mapping of landscape units in this assessment, as depicted in **VISUAL RESOURCES Figure 2,** is derived from the visual resource inventory and subsequent Interim Visual Resource Management (IVRM) Classes assigned with the involvement of BLM in the Devers-Palo Verde No. 2 Transmission Line EIR/EIS (CPUC/BLM, 2006). In the baseline setting for that document, landscape units were delineated, assessed and

rated following the BLM's Visual Resource Management (VRM) system, as documented in the visual resources analysis of that document. Following the VRM methodology, the inventory mapping and evaluation reflect an assessment of the landscape's *scenic quality*, *viewer sensitivity*, and *distance zone* of observers. While the application of the two agency methods differ in various ways, these categories are generally analogous to the three primary components of overall visual sensitivity - visual quality, viewer concern, and viewer exposure - in the Energy Commission staff method.

In general, VRM inventories within the California Desert Conservation Area (CDCA) have historically regarded the entire CDCA as having a high viewer sensitivity level, in accord with the primary goals of the CDCA Plan, which include recognition and protection of the area's unique scenic value (USDOI 1980)(CDCA Plan). In field observations at the site, staff found no inconsistencies between the delineation and evaluation of the project visual baseline in the Devers-Palo Verde study and a baseline or visual setting evaluation following the typical CEC visual assessment methods.

In the following analysis, conclusions of CEQA significance reference the IVRM Class mapping solely with respect to their field delineation of landscape units and the scenic quality ratings that underlie them. That is, for purposes of CEQA, VRM mapping is used in reference to the underlying visual resource *inventory* values. In the specific case of the Devers-Palo Verde No. 2 EIR/EIS, the Visual Resource Inventory (VRI) and Interim Visual Resource Management (IVRM) Class mapping were equivalent.

KOPs used in this study include those used in the project AFC, which were selected for the AFC in consultation with BLM staff. Additional KOPs were added by staff for this analysis. For simplicity the numbering of viewpoints in the AFC have been retained in this analysis. (All figures referred to in the text may be found at the end of this section).

In the following discussion, distance zone terminology does not refer to the BLM VRM usage, but rather is used, in the context of the Energy Commission method, as follows: 'foreground' is used generically to refer to viewing distances under ½-mile; 'middle-ground' to distances between ½ and 5 miles; 'near middle-ground' refers to that portion of middle-ground under roughly one mile; and 'background' to distances over 5 miles.

Because KOP photos represent the existing views of project simulations, the reader is referred below to these 'before project' photos in the discussion that follows. The figure numbers referring to each KOP below thus appear out of sequence, but may be found along with all other figures, at the end of this section.

KOP 1 - Ford Dry Lake Bridge Over I-10 (VRI Class III)

KOP 1 represents potential viewers of the Project from I-10 at Ford Dry Lake, as well as motorists on I-10 in general. The location is representative of the highway segment at the nearest viewing distance to the project site. KOP 1 is located on the I-10 bridge over the Ford Dry Lake Exit, directly south of the proposed eastern solar field, approximately 3 miles from the nearest site boundary. Ford Dry Lake was used as an OHV recreational area in the past, but OHV use is no longer permitted in the area. The view from the bridge is to the north and represents a middle-ground viewing distance. **VISUAL RESOURCES Figure 8a** depicts the existing view from KOP 1. The bridge is

slightly elevated above the desert floor, providing greater visual exposure to the site than the adjoining freeway. Expansive, panoramic views of Ford Dry Lake and Chuckwalla Valley in the foreground and middle-ground, and the Palen and McCoy Mountains in the near background, are highly intact and undisturbed.

Looking northward toward the project site, the landscape foreground and near-middle-ground is characterized by the flat plain of Ford Dry Lake, atypically light-colored due to a relative absence of the darker Creosote scrub vegetation cover of the region within the dry lake bed. Behind the lakebed, the distinctly darker color of scrub vegetation cover is evident, particularly on the sloping bajadas or alluvial fans descending gently from the foot of the mountains behind the site. The lakebed and bajadas are back-dropped by dark, jagged, un-vegetated ridges of the Palen and McCoy Mountains. The horizontal, homogenous form of the desert plain contrasts against the vertical irregularity of the mountain ranges that enclose it. Light soils and sparse, low-lying vegetation of the foreground lakebed contrast with dark garnets and purples of the mountains, which dominate the scene at distances close enough to reveal detail in form and texture.

Visual Quality: Overall visual quality of the lakebed and bajada landscape in which both the project site and KOP are located is considered moderate. The landscape character of the lowlands themselves is common to this region and lacking in vivid elements, but are strongly influenced and defined by the adjacent scenery of the Palen and McCoy Mountains. Visual quality of the Palen Mountains in the background is moderately high due to their vivid, highly intact character, dramatic jagged vertical form and line, and prominent, defining presence within the overall view. The McCoy Mountains to the northeast were not inventoried or mapped by BLM, but have a similar defining and vivid character in views toward the project site, and are likewise considered moderately high in visual quality.

Viewer Concern: Viewer concern is considered high due to the high number of travelers on I-10 that would be provided middle-ground views of the project from this location and vicinity. According to Caltrans Year 2008 Average Annual Daily Traffic (AADT) volumes, I-10 averages approximately 24,600 vehicles west of Wiley’s Well Road (GSEP 2009a). As mentioned above, BLM considers all areas within the CDCA to have high viewer sensitivity by virtue of the special status of the area and the primary importance of scenic resources in the plan area’s goals.

Viewer Exposure: Viewer exposure to the site is moderate. Although there is nothing obstructing views of the site, in general the very flat site terrain and very level viewing relationship between viewers on I-10 and the site result in a very oblique viewing angle. This viewing angle would be even more oblique from highway level than from this view from the elevated overcrossing. Consequently, despite the vast area of the proposed site and its vast horizontal extent, this factor in combination with distance reduces the site to a very narrow horizontal portion of the view, dominated by the dry lake foreground, and more vivid and prominent mountains and bajadas behind it. Viewer numbers on I-10 are high.

Overall visual sensitivity, reflecting the combined ratings of visual quality, viewer concern, and viewer exposure, above, is considered to be moderately high. (Please refer to Section C.12.3, above for description of sensitivity ratings.)

KOP 2 -Wiley's Well Bridge Over I-10 (VRI Class III)

VISUAL RESOURCES Figure 9a depicts the existing view from KOP 2. KOP 2 represents potential viewers of the project site from near the Wiley's Well Rest Area and interchange, as well as I-10 motorists as they approach the site from background distance. This heavily used I-10 rest area is approximately 17 miles west of Blythe. Viewing distance to the project site is roughly 5 miles or background distance. The location on the bridge provides a more elevated view than views from the rest stop itself, which are largely blocked by nearby foreground topography, or from the highway itself. The bridge is elevated above the desert floor providing a panoramic view of Chuckwalla Valley in the foreground and middleground, and Palen Mountains in the background.

The depicted in the photograph, the foreground landscape is characterized by a flat light-colored desert plain with a more typical, if sparse, creosote scrub land-cover than at Ford Dry Lake. In views northwest toward the project site, the Palen Mountains form a vivid backdrop of dark, jagged slopes and ridges at a distance of approximately 10 to 15 miles. The horizontal, homogenous form of the desert plain contrasts against the vertical irregularity of the mountain ranges enclose it. Light soils and sparse, low-lying vegetation contrast against dark garnets and purples of distant mountains.

Visual Quality: Overall visual quality of the flat plain landscape in which both the project site and KOP are located is considered moderate since the landscape character, even more than that of Ford Lake, is typical of the region and lacking in vivid elements. At this distance the sloping alluvial bajadas at the foot of the mountains are less distinct and prominent than from nearer viewpoints. Visual quality of the Palen Mountains in the background however, is moderately high due to their vivid, highly intact character, dramatic jagged vertical form and line, and prominent, defining presence within the overall view. The visual foreground seen from the rest area has a moderately high level of intactness and unity. Small, wooden H-frame poles can be seen in the foreground, but remain visually subordinate due to their small scale and dark color.

Viewer Concern: Viewer concern of this KOP is considered high due to the relatively high number of users of the Wiley's Well Rest Area, and of I-10 in the project area in general. As discussed above, BLM considers all areas within the CDCA to have high viewer sensitivity by virtue of the special status of the area and the primary importance of scenic resources in the plan area's goals.

Viewer Exposure: Viewer exposure is moderate. In general the very flat site terrain and very level viewing relationship between viewers on I-10 and the site result in a very oblique viewing angle. Thus, despite the vast area of the proposed site and its vast horizontal extent, this factor in combination with distance reduces the site to a very narrow horizontal portion of the view, dominated by the scrub foreground, and more vivid and prominent mountains and bajadas behind it. However, in the vicinity of KOP 2 at Wiley's Well Road, the most prominent project feature would be the project

transmission line. Exposure to this feature would be open and unobscured at foreground and middle-ground distances, though foreground exposure would be of relatively short duration. Viewer numbers on I-10 and at the rest area are high.

Overall visual sensitivity is considered to be moderately high.

KOP 3 - Corn Springs BLM Road

VISUAL RESOURCES Figure 10a depicts the existing view from KOP 3. KOP 3 represents the view from BLM Corn Springs Road, connecting to the Corn Springs Campground and traihead within the Chuckwalla Mountains Wilderness Area (WA) at a distance of roughly 14 miles from the nearest project features. The Corn Springs Campground is located roughly 17.5 miles from the nearest project feature, at an elevation of approximately 1600 feet. This KOP was selected by BLM staff as representative of an actively used recreational destination within the project viewshed. However, at this far background distance, project visibility would be limited, despite the elevated viewing position in relation to the project. As a designated wilderness, the Chuckwalla Mountains WA were assigned an IVRM Class I or special designation status. However, the area is located within a surrounding context assigned IVRM Class II.

Visual Quality: Visual quality of the landscape within which the KOP is located, the Chuckwalla Mountains WA, is considered moderately high. The area is highly intact and characterized by panoramic, elevated views over vast areas of the Chuckwalla Valley desert floor to the distant Palen and McCoy Mountains. As described previously, visual quality of the project site is moderate, and the adjoining Palen and McCoy Mountains are considered moderately high.

Viewer Concern: Viewer concern of visitors to the Chuckwalla WA are considered high. As discussed above, BLM considers all areas of the CDCA to have high viewer sensitivity, but this would be even more so within the WA, where the panoramic views and scenic values generally would be particularly high.

Viewer Exposure: Viewer exposure to the project is moderately low. While viewer numbers would not be high in this location, they are relatively high because the presence of a designated campsite and trailhead and their accessibility via Corn Springs Road makes it much more accessible than most of the wilderness areas in the project viewshed. While the elevation of the photograph in **VISUAL RESOURCES Figure 10a** is not known, the Corn Springs campsite and trailhead are located at roughly elevation 1,600 feet, far above the valley floor. These viewpoints (on Corn Springs Road and vicinity) are thus among the few that are readily accessible and offer elevated, panoramic views overlooking the entirety of the proposed project site. Even from this high elevation, however, the great distance (14 to 17+ miles) to the project features places the viewpoints in the far background distance zone. At this distance, the project would appear evident but would not be highly prominent.

Overall visual sensitivity from this viewpoint is considered to be moderately high.

KOP 4a, 4b – Palen/McCoy Mountains Elevated Viewpoints

Staff was unable to visit viewpoints representing elevated locations within the Palen or McCoy Mountains, and the AFC analysis does not address these viewpoints. Points within the WA are considered potentially sensitive, however. **VISUAL RESOURCES Figure 11a,** is a virtual view created with Google Earth to simulate views toward the project site from the nearest ridges of the Palen Mountains at a distance of roughly 3.75 miles to the nearest boundary of the project site, and elevation of approximately 1,475 feet. **VISUAL RESOURCES Figure 11b** is a similar virtual view from a high ridge near McCoy Springs in the McCoy Mountains at a distance of roughly 6.6 miles and elevation of approximately 2,250 feet. As described previously, the project site directly abuts the southern boundary of the Palen-McCoy WA. Most of these wilderness lands adjoining the project site comprise valley floor or sloping bajadas (alluvial fans) to background distance (5 miles). However, as indicated in the viewshed mapping in **VISUAL RESOURCES Figure 2**, a small portion of the Palen Mountain ridges falls within the middle-ground distance zone (under 5 miles). KOP 4a represents a ridge top within that small middle-ground area of exposure, located roughly 2.5 miles from the nearest (closed) jeep trail. (Motorized travel is not allowed on this trail segment.)

As also indicated in the viewshed mapping, a considerable portion of the south-facing slopes of the Palen Mountains, and most of the west-facing slopes of the McCoy Mountains, would have views of the site in the background distance zone (beyond 5 miles). KOP4b represents such a background distance view, from a ridge top in the McCoy Mountains a short distance from McCoy Springs and an existing jeep trail. Staff was unable to visit these KOPs in the field. In order to evaluate potential project effects on views to these elevated portions of the WA, staff created these virtual KOPs using Google Earth. Though less desirable than an actual field photo, these views at least provide an understanding of site visibility and exposure from these locations based on accurate topographic and project data.

Visual Quality: Visual quality of KOPs within the Palen and McCoy Mountains is considered to be moderately high. The rocky, jagged ridges and contrasting swales and alluvial washes are highly intact, with vivid form, line, color and texture. Panoramic elevated views of the vast, largely visually intact Chuckwalla Valley and Ford Dry Lake are back-dropped by distant views of the Chuckwalla and Little Chuckwalla Mountains to the south.

Viewer Concern: Again, BLM considers all areas of the CDCA to have high viewer sensitivity, and this would be even more so within the wilderness areas and elevated viewpoints, where the panoramic views, sensitivity levels, and scenic values generally would be particularly high. However, it is also important to note that BLM does not consider recreational use to be a primary objective of the WAs in this area, and recreational use was not a primary consideration in their identification as WAs.

Viewer Exposure: As indicated in the viewshed mapping of **VISUAL RESOURCES Figure 2,** the project site would be visible from various points within the Palen and McCoy Mountains, primarily south-facing ridges of the Palen Mountains, and west-facing slopes of the McCoy Mountains. These elevated viewpoints are the only ones from which the expanse of the project site could be clearly seen. Visibility would range

from moderate to moderately low as a function of height and distance. Within middle ground distance (under roughly 5 miles), the vertical angle of view from elevated portions within the mapped viewshed would be sufficiently great, and sufficiently near, to expose the expanse of the mirror fields to view with a moderate level of dominance within the overall field of view. Viewers would be near enough to be looking ‘down’ on the expanse of the mirror field, at a relatively perpendicular vertical angle, as indicated in KOP 4a. In contrast, from more distant portions of the viewshed (very roughly beyond 5 miles), the angle of view would decrease as a function of distance, becoming more oblique so that the project site would occupy a smaller proportion of the overall field of view. With increasing distance viewers are no longer looking ‘down’ at the project, but ‘across’ it at a flat (oblique) angle that results in considerable foreshortening of the mirror field, reducing its expanse to a relatively narrow area, as indicated in KOP 4b. Viewer numbers are not known, but are considered to be low. Motorized travel is not allowed within the WA. The nearest (closed) jeep trail is roughly 2.5 aerial miles from KOP 4a; the nearest motorized portion of that trail is several miles to the southwest of that point. The McCoy Mountains, located largely though not entirely outside of the designated WA, appear from aerial photos to be more accessible by jeep trail. However, distance to the project site from elevated portions of the McCoy Mountains is well over 5 miles at the nearest points, with a resulting decrease in visual exposure due to distance and oblique vertical angle, as described above.

There are no designated trails within the WA, but closed jeep trails are present in the valley and can be used for hiking. The accessibility of elevated viewpoints within the middle-ground distance zone, and therefore the potential number of viewers, is presumed to be low. Visitor numbers in the WAs is not formally monitored by BLM, however BLM considers that the number of legal visitors is low (off-road use of these areas that may occur is not permitted). In addition, the extent of elevated viewpoints within middle-ground distance of the project site is very limited, essentially to portions of one ridge north of the site, as indicated in the mapped computer-generated viewshed depicted in Visual Resources Figure 2 View duration at both elevated portions of the viewshed (Palen and McCoy Mountains) is relatively high due to the fact that any viewers would be on foot.

In the Palen Mountains, however, the duration of middle-ground views is limited somewhat by the very small area in which project visibility occurs at those distances and corresponding viewing angles; hikers on this ridge would presumably soon leave the ridge on which the project is seen at perpendicular vertical angles and middleground distance. Beyond this small portion of the viewshed, visual magnitude of the mirror fields would fall off due both to distance, and to increasingly oblique (flat) vertical viewing angle. (Visual magnitude decreases as the square of distance). For these reasons – the limited extent of this portion of the viewshed, and resulting limited viewer numbers and view duration - viewer exposure to the project from within the elevated middle-ground, where viewing angles are more perpendicular and visual magnitude higher, is considered to be very limited. Viewer exposure to the site from the elevated background distance zone within the Palen and McCoy Mountains is considered to be moderately low: the area in which exposure occurs is much greater than within middleground; viewer numbers are likewise higher due to greater (motorized) accessibility in the McCoy Mountains, but remain relatively low, and visibility is considerably reduced by both oblique vertical viewing angle and reduced visual

magnitude due to angle and distance. Because the viewer number and duration with moderate project visibility appears limited, overall viewer exposure is characterized as moderately low. Consequently, overall viewer sensitivity of these elevated viewpoints in the Palen and McCoy Mountains is considered moderate.

Palen-McCoy WA Lowland Viewpoints (No KOP)

Staff was unable to obtain photographs of a representative KOP in the lowland portions of the WA. However, studies of 3D ground-level views via Google Earth appeared to confirm viewing conditions that seem intuitively obvious; that is, from valley viewpoints north of the project site, the relatively level terrain relationship between viewers and site would be very similar to those depicted in KOPs 1 and 2. Because of the very oblique vertical viewing angle, the site would tend to be reduced to a very narrow horizontal line within the overall view in all but the foreground distance zone (under ½ mile), contributing to low viewer exposure.

The vast horizontal scale of the site would remain evident, particularly within the middle-ground distance zone (under 5 miles). The number of viewers from such lowland viewpoints is not known, but is considered to be relatively low based on anecdotal knowledge of BLM staff. The likely number of viewers at foreground distance to the project would be insignificant and their view duration low. Numbers at middle-ground and background distances would be moderately low. Overall exposure would thus remain moderately low.

Thus, despite high visual quality and viewer concern, overall sensitivity is considered moderate.

Project Visual Description

Power Plant

The following description is taken entirely from the AFC project description (GSEP 2009a). **VISUAL RESOURCES Figure 4** depicts the layout of the two proposed project phases. **VISUAL RESOURCES Figure 5** depicts architectural elevations of the proposed power blocks. **VISUAL RESOURCES Figure 6** depicts the proposed solar collector mirror units. **VISUAL RESOURCES Figure 7** depicts the proposed Gen-Tie transmission line poles.

The proposed project would include an overall project footprint of approximately 1,800 acres (2.8 square miles), plus approximately 90 acres of linear facilities. The overall number of solar arrays is not identified in the AFC but the arrays are conceptually depicted in **VISUAL RESOURCES Figure 4.** Site elevation ranges from roughly 370 to 400 feet. This amount of fall (roughly 30 feet) over a minimum distance of over one mile results in a virtually flat site, with an overall .5% slope. Because the trough technology requires nearly level grades, the entire site would be benched and graded to 2% slope or less.

The collector field consists of multiple single-axis parabolic trough solar collectors, aligned on a north-south axis. Each parabolic trough focuses the sun's rays on a linear,

length-wise heat collection element at the parabolic focal point. In addition, the project would include:

- Two power blocks, one per plant, including steam turbine generators and related equipment;
- Administrative building and warehouse between the two power plants; a control building within each power block; a water treatment building and other structures with an overall area of approximately 39,000 square feet (0.9 acre).
- Two 500,000 gallon cooling water storage tanks; a 1,250,000 gallon treated water storage tank; a 250,000 waste water storage tank; a 40,0000 gallon demineralized water storage tank
- Two wet cooling towers
- A 270-by-400-foot switchyard
- 35 acres of paved area
- two 24-acre of evaporation ponds (one per generation unit, locate between the two mirror fields

Construction Staging Area

The size of construction laydown areas is not described in the AFC but would be provided within the project site or, for construction of the proposed transmission gen-tie line, at Wiley's Well Rest Area southeast of the site north of I-10. Project construction is expected to last 37 months.

Site Grading

Site grading would potentially represent a substantial visual component of the proposed project during construction. After construction, grading of roads, laydown areas and other activities outside the main project footprint would remain visually disturbed unless restored. Surface disturbance of the proposed site, as in most desert landscapes of the region, can often result in high contrast between the disturbed area and surroundings, due to high contrast between the disturbed soil color and albedo, and the color and albedo of the existing undisturbed, vegetated surface. Furthermore, effectiveness of revegetation in this arid environment is difficult, of limited effectiveness, and capable of recovery only over a very long-term time frame.

Plant Night Lighting

Project lighting is not described, but would be designed to provide 'minimum illumination needed to achieve safety and security.'

Linear Facilities

Linear facilities would include:

- a six-mile long, eight-inch natural gas pipeline connecting to a Southern California Edison pipeline north of I-10. The pipeline ROW would follow the proposed gen-tie transmission line alignment.

- A gen-tie transmission line connecting to the SCE Colorado River substation, consisting of 75-foot tall single-pole towers. The line would cross I-10 from north to south at Wiley's Well Road and join the Blythe Energy Project Transmission Line a short distance south of I-10 along Wiley's Well Road. Length of the line is not described in the AFC but appears from figures to be approximately 7.5 miles off-site, and roughly 3.4 miles within the site.

C.12.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct Project Impacts

Project Operation Impacts

Impacts of Structures on Key Observation Points

KOP 1 - Ford Dry Lake Bridge Over I-10 (VRI Class III)

Visual Resources Figures 8A and 8B depict the view of the site from KOP1, at a middle-ground distance of approximately 3 miles looking northward, and is representative of the view of motorists on I-10 at their nearest point to the project. As depicted in Figure 8B (Phases 1 and 2), the project would occupy a vast horizontal area, extending across the entire width of the field of view. However, as illustrated in the simulation, the proportion of the field of view at this distance remains very small due to the level viewing relationship, low facility height, and distance. Staff understands that frequently, the level of brightness of the mirror field could be much greater than depicted in the simulation, substantially increasing the project's level of contrast under certain conditions. In general, the thin horizontal line of the mirror field mimics the predominantly horizontal lines of the broad, level foreground lakebed. A small amount of vertical form contrast is visible from the power blocks, warehouses, cooling towers and other site buildings, but at this distance the contrast is minimal and largely attributable to color contrast.

Spatial and scale dominance of the vast mirror fields is potentially great, but again greatly moderated by the very narrow portion of the view affected. Dominance would be accentuated during conditions of bright mirror reflection, which would draw attention to the facility. Overall, however, visual dominance of the project from this typical highway viewpoint would be moderately low under most conditions, to moderate during times of bright reflection.

View blockage would be negligible. Taller structures such as the control building and transmission towers would intrude slightly into the view of background bajadas but would remain at a low level. This intrusion would be reduced greatly by Condition of Certification VIS-1, requiring painting of structures in colors selected to blend with the background characteristic landscape.

Overall visual change to viewers on I-10 is thus considered moderately low, or moderate during the brightest periods of diffuse glare as indicated in **Visual Resources Figure 12** (below). Visual change could rise to a moderately high level if viewers were exposed to bright point spread reflections of the sun as depicted in **Visual Resources**

Figure 13 (below). With staff-recommended Condition of Certification VIS-4, bright point reflections could be blocked, reducing glare to occasional episodes of moderate visual change from diffuse reflection from the mirror fields as a whole. With all recommended conditions of certification, overall visual change would thus remain moderate. Depending upon lighting conditions, the project would range from weak to moderate levels of visual change, would attract some attention but would not dominate the existing landscape.

In the context of the setting's moderately high visual sensitivity, this moderate level of visual change would, with recommended conditions of certification, be less-than-significant.

Mitigation – To minimize form and color contrast of the taller project facilities, staff recommends Condition of Certification VIS-1, Surface Color Treatment of Non-Mirror Structures. To minimize potential bright reflective glare effects, staff recommends Condition of Certification VIS-4, Reflective Glare Mitigation. To reduce other visual contrasts from roads, structures, buildings, and support infrastructure, staff recommends VIS-6, Reduction of Form, Line, and Texture Contrast.

KOP 2 -Wiley's Well Bridge Over I-10 (VRI Class III)

Visual Resources Figures 9A and 9B depict the view from KOP 2, Wiley's Well Rest Area, approximately 5 miles southeast of the project site. It is also representative of the views of motorists on I-10 as they enter the middle-ground distance zone from background distance. The photograph actually depicts views from atop the Wiley's Well over-crossing bridge and is slightly elevated above the main highway and rest area. Actually, the project mirror fields would not generally be visible from the rest area itself due to foreground anomalies in terrain, which block views to the site from the rest area.

Staff comment on AFC simulation of KOP 2: The simulation of KOP 2 is framed in such a way as to omit proposed project transmission towers closer than three miles in distance. However, the proposed transmission line would actually be the most prominent project feature from the vicinity of Wiley's Well Road, with the nearest poles paralleling I-10 a short distance to the north (roughly ¼-mile for one mile; less than ½-mile for one mile), and then paralleling Wiley's Well Road immediately south of the over-crossing. There are thus no simulations of the transmission line within the foreground distance zone where it would appear most prominent.

As suggested in the simulation of KOP 2, visual contrast of the mirror fields at background and far-middle-ground viewpoints similar to this would be low. On occasions of greatest reflective brightness, contrast could rise to moderate levels. With staff-recommended glare mitigation measures, bright spot reflections of the sun would not be anticipated, as discussed further below.

The proposed transmission line and towers however would be visible in the foreground from Wiley's Well Road and vicinity, including I-10. The portions of the transmission line following Wiley's Well Road to the interconnection with the Blythe Project Transmission Line would not be a concern because views southward toward this segment include a very prominent communication tower adjacent to the interchange, the Blythe

transmission line at a distance of roughly 1-1/4 mile, and Chuckwalla Valley and Ironwood State Prisons at a distance of roughly 3 miles to the south. However towers and lines paralleling I-10 would introduce a moderately prominent discordant element into the freeway foreground, with strong vertical line and form contrast for a roughly two-mile segment of highway. **Visual Resources Figure 9C** depicts the portion of I-10 in which the proposed transmission line would parallel the highway at foreground distance, as viewed from the Wiley's Well Road overcrossing.

At this distance and horizontal viewing angle, the mirror fields' spatial and scale dominance would remain low, occupying a small portion of the field of view. The segments of the proposed transmission line in the I-10 foreground would exert moderately strong contrast and dominance.

View blockage due to the mirror fields would be negligible. The transmission line would intrude into the foreground of northward views from the highway toward the Palen Mountains, degrading the quality of those views for a distance of roughly two miles.

Overall visual change of the mirror fields from this location and others at a similar distance zone would thus be low and impacts relatively minor.

The proposed transmission line, including 75-foot single-pole transmission towers, however, would be an obtrusive element in the foreground of views for roughly two miles of I-10 and, in the context of moderately high viewer sensitivity, could represent a substantial impact. Staff thus recommends Condition of Certification VIS-1, Surface Color Treatment of Non-Mirror Structures, to lower color contrast of the proposed transmission poles and blend with the visual background; and Condition of Certification VIS-3, Realignment and Visual Mitigation of Proposed Transmission Line, to reduce the contrast of transmission towers by use of lattice-style towers, and to minimize the portion of the ROW within foreground viewing distance of I-10 by ½-mile setbacks from the highway.

Setbacks of transmission lines, however, shall be determined consistent with any cultural or biological constraints identified in those portions of this Staff Assessment. With these measures, portions of the new line beyond foreground distance would exert moderately low overall visual change under most viewing conditions. Foreground portions of the line would remain obtrusive but would be substantially reduced in extent. With these measures, impacts to motorists and rest area visitors would be adverse, but less-than-significant.

A proposed construction laydown area would be located near this KOP, with potentially substantial visual impacts to visitors at the rest area for the period of construction. This impact is discussed further under Project Construction Impacts, below.

Mitigation - To minimize adverse impacts of proposed transmission poles, staff recommends Condition of Certification VIS-1 and VIS-6 to be applied to the proposed gen-tie transmission poles; and Condition of Certification VIS-3 to reduce the visual contrast of towers and the length of the segment of transmission line within foreground distance of Highway I-10.

KOP 3 - Corn Springs BLM Road

Visual Resources Figures 10A and 10B depict KOP 3, the view from Corn Springs Road, an unpaved BLM road leading to a campground and trailhead approximately 14 miles southwest of the project site adjoining the Wilderness Area. This KOP was selected by BLM staff as representative of an actively used recreational destination within the project viewshed. However, at this far background distance, project visibility would be limited, despite the elevated viewing position in relation to the project.

As described in Section C.12.4.1, overall visual sensitivity from this viewpoint is considered to be moderately high. The KOP is located within an area designated as VRM Class I, since it is within the Chuckwalla WA. Nearby areas outside the WA were assigned VRI/IVRM Class II.

As depicted in **Visual Resources Figures 10A and 10B,** the elevated location within the Chuckwalla Mountains presents a panoramic view of a vast expanse of the valley floor. However, at this far background distance the project, while visible, would exhibit a low level of overall contrast. The simulation depicts hazy conditions that reduce visibility of the project, and those conditions would not always be the case. The project would be evident to viewers, drawing attention by its textural and color contrast, and the valley floor would lose its existing highly intact, undisturbed character. That level of contrast would be greater periodically, during instances of higher reflected glare, particularly in the afternoon. However, the project at this distance would have low form and line contrast with its setting and would remain visually subordinate to the background mountains, valley floor, and Palen and Ford Dry Lakes.

Spatial and scale dominance of the project at this distance would be low, subordinate to other features dominating the view, particularly the Palen Mountains. The project would occupy a small portion of the overall view.

View blockage would be negligible. The low project features would not intrude into views of the mountains or other scenic elements.

Overall visual change from the project at this distance would thus range from low to moderately low depending upon brightness of reflected glare. In the context of moderately high visual sensitivity, this would represent a less-than-significant impact.

KOP 4a, 4b – Palen/McCoy Mountains Elevated Viewpoints

VISUAL RESOURCES Figure 11A is a virtual view created with Google Earth to simulate views toward the project site from the nearest ridges of the Palen Mountains at a distance of roughly 3.75 miles to the nearest boundary of the project site. Elevation is approximately 1,475 feet or roughly 1,100 feet above the project site. It is representative of a small area of the nearest ridge of the Palen Mountains north of the project site with views of the project that fall within the middle-ground distance zone (under 5 miles). This one ridge is the only elevated location with views to the project site from middle-ground distance. **VISUAL RESOURCES Figure 11B** is a similar virtual view from the McCoy Mountains at a background distance of roughly 6.6 miles and elevation of 2,250 feet. It is representative of the more extensive portions of the McCoy and Palen Mountains from which the project would be visible at background distance (over 5 miles)

as depicted in viewshed mapping in **VISUAL RESOURCES Figure 2.** Both schematic simulated views are created in Google Earth from accurately scaled layouts of the project footprint, and have been cropped to emulate a 'normal' camera lens (approximately 40 degree horizontal angle of view**).**

KOP 4a (Elevated Middle-Ground). As suggested in **VISUAL RESOURCES Figure 11A,** from elevated middle-ground viewpoints in the Palen Mountains, the vertical angle of view is such that visual exposure of the mirror fields would exhibit moderate rectilinear form contrast, as well as strong color and texture contrast with the setting. The latter, however, would vary greatly according to changing brightness levels of diffuse reflected sunlight. At this height and distance, the project would appear as more than a thin contrasting line, as it would in views from the valley; however, the angle of view also remains sufficiently oblique that the proportion of the overall view occupied by the mirrors is moderate. Taller project structures would present some vertical form contrast, but would be seen against the background of the mirror fields, reducing character contrast. At this distance, the relative contrast and dominance from the non-mirror structures would be subordinate to the mirror fields, and would be reduced by painting to blend with the surrounding landscape under staff-recommended Condition of Certification VIS-1 and VIS-6. The project would block views. It is not possible for staff to predict the brightness of reflection or the frequency of distracting or nuisance levels of glare to be anticipated without more experience with similar projects viewed from similar viewpoints. However, based on aerial photographs of existing trough projects, as illustrated in **VISUAL RESOURCES Figure 12,** staff concludes that overall visual change from the project would vary from moderate to moderately strong levels according to time of day and brightness of diffuse reflection.

In the context of moderate visual sensitivity, this could represent an adverse visual impact under conditions of bright reflection. However, taking into account both the episodic nature of bright reflections, and the very low number of viewers from this middle-ground portion of the viewshed, the level of impact is considered to be less-than-significant.

VISUAL RESOURCES Figure 12 depicts photos of similar solar trough projects, including oblique aerial photos of the 64 MW Acciona Nevada Solar One pilot project. As illustrated in these photographs, the appearance of solar trough projects from elevated viewpoints changes substantially according to time of day and sun angles to the viewer, ranging from a brightly lit surface, to reflections of the sky, to dark colors, each condition contrasting with the surroundings in a different way and degree. Photo 12a also illustrates the phenomenon in which bright spread reflections of the sun's image may cause bright linear or point reflections at certain sun/viewer angles. This impact is discussed below under the analysis of glare impacts. Note also the large evaporation ponds, which are visible from elevated viewpoints and display strong color contrast in some photos. According to the AFC there would be two 24-acre evaporation ponds, one for each generation unit, located between the two mirror fields ((GSEP 2009a).

KOP 4b (Elevated Background). **VISUAL RESOURCES Figure 11B** is representative of background distance zone viewpoints within the Palen and McCoy Mountains. It is a virtual view of the project footprint from the ridge above McCoy Springs, a short

distance from a jeep trail at the spring, roughly 6.6 miles from the project site at an elevation of approximately 2,250 feet or roughly 1,800 feet above the project site.

As suggested in the figure, from this high point of the first ridge facing the project site, the project footprint appears relatively oblique, with moderately low rectilinear form and line contrast. Taller project structures would present some vertical form contrast, but at background distance, this component of project contrast would be relatively low. Color and texture contrast of mirror fields would again vary from moderate to strong levels depending upon light conditions. Overall, contrast would be moderate.

At this distance, the project occupies a moderate proportion of the field of view and remains subordinate to the visual foreground and the expanse of the valley floor. The project would block views of the portion of the valley floor it occupies, but only to a very limited degree due to the very oblique vertical viewing angle.

Overall visual change from the project at such elevated background viewpoints would thus be moderate. The project would be very evident and begin to attract attention, but would remain subordinate within the existing setting.

In the context of moderate overall visual sensitivity, this could represent an adverse visual impact, particularly under episodic conditions of bright reflection, but is considered to be less-than-significant. As distance to viewpoints increased, the level of impact would decline further.

Palen-McCoy WA Lowland Viewpoints (No KOP)

As indicated in the viewshed mapping of **VISUAL RESOURCES Figure 2,** the project would be visible from nearly the entire radius of the valley floor around it within the middle-ground distance zone (less than 5 miles), including a large portion within the Palen-McCoy WA to the north and northeast of the site. A large area of lowlands within the WA at background distance (beyond 5 miles) would also have views of the site.

Staff was unable to access or obtain photographs of a representative KOP in these lowland portions of the visual middle-ground within the WA. However, studies of 3D ground-level views using Google Earth appeared to confirm viewing conditions that seem intuitively obvious; that is, from valley viewpoints north of the project site, the relatively level terrain relationship between viewers and site would be very similar to those depicted in KOPs 1 and 2. Due to the very level viewer-to-site relationships, the project, which is low in height, would appear as a thin horizontal line in all but foreground (1/2-mile and under) views. As from KOP 1, the project would extend over a vast horizontal extent of the view from middle-ground viewpoints. However, the proportion of the overall field of view occupied by the mirror fields would be small due to the level viewing conditions and low project height, appearing as a thin contrasting line. The field of view would be strongly dominated by an expansive visual foreground, and visually dominant mountains in the middle-ground and background. As from KOP 1, project contrast and dominance in the middle-ground distance zone would range from moderately low to moderate depending upon brightness of reflective glare. However, with staff-recommended Condition of Certification VIS-4, bright spread reflection as seen from valley floor viewpoints would be screened by slatted fencing at the project

perimeter. Glare-related contrast and dominance would consequently be kept to moderately low levels. Project structures would also exert some vertical form contrast. However as noted under the discussion of KOP 1, at distances of roughly 2-1/2 or 3 miles, structure contrast is subordinate within the overall view and attributable primarily to color contrast. With staff-recommended Condition of Certification VIS-1, color contrast would be substantially reduced to blend with the darker visual background and reduce form and line contrast. The project would not block or intrude into scenic views except from foreground locations. Overall visual change with recommended mitigation would thus be moderately low.

The number and duration of views within foreground and very-near-middle-ground viewpoints where the project could have high contrast is considered to be very low and thus of minor concern. Therefore, notwithstanding a moderately high level of viewer sensitivity, this would represent a less-than-significant level of impact.

Glare Impacts

The primary source of potential glare from the project is the mirrored surfaces of the solar collector arrays. Staff observations confirm that during certain times of day the mirror units can produce substantial glare and that such glare can be experienced by the public from locations in the project vicinity as intrusive nuisances and may be a distraction, but generally do not pose a visual hazard except for persons within 60 feet of the plant perimeter fence. Public exposure to the Genesis project at this distance is not anticipated. There are no known quantitative thresholds for determining unacceptable levels of nuisance or discomfort glare.

Visual Resources Figure 13A depicts a typical project reflection as documented by staff at the Kramer Junction SEGS project in mid-morning. **Visual Resources Figure 13B** depicts a view of the Acciona Nevada One trough project at middle-ground distance. When looking toward the mirrors, the bright spots depicted are believed by staff to be spread reflections of the sun. They are seen when the observer is off-axis from the focal plane of the troughs and, as can be seen in the photos, may appear to be very bright. The bright spots also appear to ‘follow’ the viewer as one’s relationship to the sun changes. Based on data on file with the Commission, staff concludes that when trough systems rotate from stow position to tracking position in the morning and the reverse in the evening they produce a linear reflected solar image which may be visible briefly to nearby observers. As illustrated in **Visual Resources Figure 13B**, these reflections may, under the right conditions, be prominently visible from several miles away. Within a zone of 20 meters from the plant perimeter this image may exceed a level deemed safe for the human eye of 4.5 kW/m^2. Beyond this distance, though potentially very bright, they are not believed to pose a physical hazard. At a minimum, however, similar off-site glare observed by staff was considered a nuisance, and felt to be a discomfort if directly observed for more than a few moments.

In order to substantially reduce the brightness of such spread reflections of the sun for valley floor viewers, staff recommends Condition of Certification VIS-4, Reflected Glare Mitigation, requiring slatted perimeter fencing. Based on available data, staff concludes that implementation of this measure would prevent bright spot reflections for viewers at ground level on the valley floor, including motorists on Highway I-10.

Nighttime light pollution as a result of the project is a concern in the project vicinity. The existing Chuckwalla Valley within the project viewshed is essentially dark at night. The pristine, unlit night sky is an important part of the camping experience for many visitors to remote areas such as the nearby Wilderness Areas. Unmitigated night lighting of the project could represent a substantial impact to the experience of campers in these wilderness areas.

Project lighting is not described in detail in the AFC, but would be designed to provide 'minimum illumination needed to achieve safety and security.'

To minimize potential nighttime light pollution, address potential impacts from construction lighting, and further minimize potential night lighting impacts to campers in the Palen-McCoy Wilderness, staff recommends Condition of Certification VIS-2. This measure would require that all exterior lighting be designed such that lamps and reflectors are not visible from beyond the project site; lighting does not cause excessive reflected glare; direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting, if any; and illumination of the project and its immediate vicinity is minimized to an 'as needed' basis wherever feasible consistent with safety.

Visible Vapor Plume Impacts

The proposed project is a thermal solar design that requires cooling to condense the steam that is recycled. The applicant has proposed two seven-cell mechanical-draft cooling towers for project cooling. The applicant has not proposed to use any methods to abate visible plumes from the cooling towers.

Staff completed a modeling analysis for the applicant's proposed unabated cooling tower design using the Combustion Stack Visible Plume (CSVP) model to estimate plume frequency and plume dimensions for the cooling tower exhaust. This model provides conservative estimates of both plume frequency and plume size. The modeling study may be found in its entirety in **Appendix VR-2.**

Based on this analysis, visible water vapor plumes from the proposed Genesis Solar cooling tower would occur 10.75% seasonal daylight clear hours. Energy Commission staff apply a 20% seasonal daylight clear hour criterion for identifying potentially significant visible plume impacts. Because visible plumes are anticipated to occur for less than 20% of seasonal daylight clear hours, no significant impact is anticipated and no further modeling was performed.

Due to their small size and limited operation significant visible water vapor plumes are not expected from the two small Genesis auxiliary boilers.

Project Construction Impacts

Construction Staging Area

The size of construction laydown areas is not described in the AFC but would be provided within the project site or, for construction of the proposed transmission gen-tie line, at Wiley's Well Rest Area southeast of the site north of I-10. Project construction is

expected to last 37 months. Laydown within the project site would thus be potentially visible but would occupy a smaller area than the project itself. Laydown would thus have substantially lower impact than either site grading or the completed project itself. The effects of laydown within the main project footprint would be less than significant. Laydown for construction of the proposed transmission line is proposed near the Wiley's Well Rest Area. Because of proximity, this laydown area could potentially be visually prominent, and represent an adverse effect on the visual quality of the rest area for the high numbers of visitors to this facility over the period of transmission line construction, which is not quantified in the AFC. This could represent a substantial visual impact. In order to minimize these impacts, staff recommends Condition of Certification VIS-5, Visual Mitigation and Revegetation of Staging Area, including screening of the laydown area with earth berms, opaque fencing, and/or other measures to minimize visibility from within the main rest area, consistent with any cultural or biological resource constraints identified in those portions of this Staff Assessment; and restoration and revegetation of the laydown area after completion of construction, again consistent with cultural and biological constraints. Staff also recommends VIS – 6, Reduction of Form, Line, and Texture Contrast to minimize the contrast of laydown areas with associated graded landscapes, roads, and other infrastructures. With these recommended measures, impacts would be reduced to a less-than-significant level.

Site Grading

Site grading would potentially represent a substantial visual component of the proposed project during construction. Surface disturbance of the proposed site, as in most desert landscapes of the region, would result in high contrast between the disturbed area and surroundings, due to high contrast between the disturbed soil color and albedo, and the color and albedo of the existing undisturbed, vegetated surface. Furthermore, effectiveness of revegetation in this arid environment is difficult, often of limited effectiveness, and capable of recovery only over a very long-term time frame. Although grading impacts would be similar in extent to the completed project itself, the latter were found to be less-than-significant from all KOPs. Therefore, grading impacts would also be less-than-significant.

Indirect Impacts

No indirect visual impacts of the project were identified.

Closure and Decommissioning Impacts and Mitigation

Permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan. 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.

The removal of the existing facility would leave a very prominent visual impact over the entire site due to form, line, color and texture contrast created between graded or disturbed soil areas and undisturbed areas in the region of the project site. This color contrast is due particularly to the removal of the dark color element contributed by normal scrub vegetation cover. After decommissioning, the site would leave a rectilinear area of form, line, color and texture contrast visible mainly to elevated locations within

the adjacent wilderness area. Revegetation of areas in this desert region are difficult but have been implemented by the BLM with success over time. Thus, visual recovery from land disturbance after closure and decommissioning could take place, although over a long period of time, with implementation of an active and comprehensive revegetation program for the site.

C.12.4.3 CEQA LEVEL OF SIGNIFICANCE

Appendix G of the CEQA Guidelines four significance criteria for evaluating aesthetic impacts, as follows.

A. Would the project have a substantial adverse effect on a scenic vista?

No specific designated scenic vista locations were identified in the project viewshed. However, as discussed above, BLM considers that a primary purpose of the CDCA is to recognize and conserve the natural beauty and scenic recreational qualities of the California Desert. As described above, various KOPs with high levels of viewer concern for scenic values would be affected by the project, including motorists on Highway I-10, and visitors to the Palen McCoy Wilderness Area. Because these effects were determined to be less than significant in the staff analysis presented above, significant adverse effects on scenic vistas are not anticipated.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-10, which is not listed as an eligible State Scenic Highway. No notable scenic features or resources are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic resources within the project viewshed in general are discussed under Item C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

As described in the main analysis above, the project could degrade the existing visual character and quality of views from Highway I-10 and the Palen McCoy Wilderness. However, with staff-recommended Conditions of Certification, these impacts are considered to be either less-than-significant, or mitigable to less-than-significant levels

D. **Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?**

Reflected glare is an issue of concern for the Genesis Solar Project, primarily due to the potential to accentuate project contrast and aesthetic impact. Potentially affected receptors would include motorists on I-10 and at Wiley's Well Rest Area, and visitors to the Palen McCoy Wilderness.

Staff conducted an independent review of potential glare impacts. The results of this review are summarized in the discussion of Glare Impacts, above. With recommended Condition of Certification **VIS-4**, impacts could be reduced to less-than-significant levels.

Project lighting is not described in detail in the AFC, but would be designed to provide 'minimum illumination needed to achieve safety and security.' However, night lighting of control room, warehouses, administration building, project roadways, or security lighting could all potentially contribute to nighttime light pollution.

To minimize potential night lighting impacts to campers in the Palen McCoy Wilderness, staff recommends Condition of Certification **VIS-2**. This measure would require that all exterior lighting is designed such that lamps and reflectors are not visible from beyond the project site; lighting does not cause excessive reflected glare; direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting, if any; and illumination of the project and its immediate vicinity is minimized and kept to an 'as needed' basis wherever feasible consistent with safety.

With the measures in this condition, project night lighting would be reduced to a less-than-significant level.

C.12.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.12.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components, and is as described for the Proposed Project in section 14.4.1.

C.12.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Project Operation Impacts

Impacts of the Reduced Acreage Alternative would be similar in character but greatly reduced in extent and degree compared to the Proposed Project from all KOPs. Under the Proposed Project, staff concluded that impacts to all KOPs with recommended conditions of certification could be reduced to less-than-significant levels. Those impacts would be reduced further under the Reduced Acreage Alternative.

Impacts of non-mirror project structures would be reduced in extent compared to the Proposed Project but could still result in form, line and color contrast that would introduce an industrial character into the view of all KOPs. Staff therefore recommends Condition of Certification VIS-1 to reduce contrast of non-mirror project structures. Similarly, night lighting impacts would be reduced but not eliminated and could result in adverse nighttime light pollution. Staff therefore recommends Condition of Certification VIS-2 to reduce and minimize potential nighttime lighting impacts.

However, the anticipated operation and construction impacts of the proposed gen-tie transmission line would remain the same as under the Proposed Project, and potentially significant. Staff therefore recommends Conditions of Certification VIS-3 and VIS-5 for the Reduced Acreage Alternative as well, in order to reduce potential impacts of the transmission line to less-than-significant levels.

Contributions to heightened project contrast due to reflective glare would be reduced because the area and extent of the project footprint would be reduced by half. However, bright spread reflections could still be visible off-site under the Reduced Acreage Alternative. Staff therefore recommends Condition of Certification VIS-4 under this alternative to screen potential bright off-site reflection impacts. Potential visible vapor plume impacts under the Proposed Project were found by staff to fall below Energy Commission impact thresholds and therefore to be less-than-significant. Visible vapor plumes would presumably be reduced substantially as compared to the Proposed Project, reducing this impact further and representing an overall visual improvement as compared to the Proposed Project.

Project Construction Impacts

Presumably the area needed for project laydown under Alternative 1 would be proportionately less than under the proposed project, both in extent, and in duration. However, impacts from laydown within the project site were considered to be less-than-significant in impact. This would also be true of impacts under the Reduced Acreage Alternative.

Laydown for construction of the proposed transmission line would take place near the Wiley’s Well Rest Area under this alternative. Presumably, the length of time for this portion of project construction would be the same as that under the Proposed Project thus resulting in substantial visual impacts to the high numbers of visitors to this facility over the period of transmission line construction, which is not described in the AFC. In order to minimize these impacts, staff recommends Condition of Certification VIS-5, Visual Mitigation and Revegetation of Staging Area, including relocation of the laydown site to the south of the Wiley’s Well Road interchange; or screening of the laydown area with earth berms, opaque fencing, and/or other measures to minimize visibility from within the main rest area; restoration and revegetation of the laydown area after completion of construction. Staff also recommends Condition of Certification VIS-6, Reduction of Form, Line, and Texture Contrast, to minimize the contrast of solar panels and supports, laydown areas, roads, buildings, other structures, and graded landscapes.Site grading impacts would be substantially less than under the Proposed Project because the affected area would be less. These impacts would be less-than-significant under all action alternatives.

C.12.5.3 CEQA LEVEL OF SIGNIFICANCE

Appendix G of the CEQA Guidelines four significance criteria for evaluating aesthetic impacts, as follows:.

A. Would the project have a substantial adverse effect on a scenic vista?

No specific designated scenic vista locations were identified in the project viewshed. However, as discussed above, BLM considers that a primary purpose of the CDCA is to recognize and conserve the natural beauty and scenic recreational qualities of the California Desert. As described above, various KOPs with high levels of viewer concern for scenic values would be affected by the project, including motorists on Highway I-10, and visitors to the Palen McCoy Wilderness Area. These effects would be substantially less under the Reduced Acreage Alternative than under the Proposed Project. Because potential visual effects were considered to be mitigable with staff-recommended mitigation measures under both the Proposed Project and Reduced Acreage Alternative, substantial adverse effects on scenic views are not anticipated under either alternative.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-10, which is not listed as an eligible State Scenic Highway. No notable scenic features or resources are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic resources within the project viewshed in general are discussed under Item C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

As described in the main analysis above, the project could degrade the existing visual character and quality of views from Highway I-10 and the Palen McCoy Wilderness. These effects would be substantially less than under the Proposed Project because the affected area would be roughly ½ of the Proposed Project. However, with staff-recommended Conditions of Certification, these impacts are considered to be mitigable to less-than-significant levels under all action alternatives, including the Reduced Acreage Alternative.

D. **Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?**

Reflected glare is an issue of concern for the Genesis Solar Project, primarily due to the potential to accentuate project contrast and thus aesthetic impact. Potentially affected receptors would include motorists on I-10 and at Wiley's Well Rest Area, and visitors to the Palen McCoy Wilderness. Under the Reduced Acreage Alternative these effects would be substantially less, because the affected area would be roughly ½ of the Proposed Project. However, the potential to create occasional, very bright spread

reflections of the sun visible at a distance would remain under this alternative and could be substantial. With recommended Condition of Certification **VIS-4**, however, this impact would be reduced to a less-than-significant level.

Project lighting is not described in detail in the AFC, but would be designed to provide 'minimum illumination needed to achieve safety and security.' However, night lighting of control room, warehouses, administration building, project roadways, or security lighting could all potentially contribute to nighttime light pollution.

To minimize potential night lighting impacts to campers in the Palen McCoy Wilderness, staff recommends Condition of Certification **VIS-2**. This measure would require that all exterior lighting is designed such that lamps and reflectors are not visible from beyond the project site; lighting does not cause excessive reflected glare; direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting, if any; and illumination of the project and its immediate vicinity is minimized and kept to an 'as needed' basis wherever feasible consistent with safety.

With the measures in this condition, project night lighting would be reduced to a less-than-significant level.

C.12.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

C.12.6.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.12.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Under the Dry Cooling Alternative, the ACC would be located immediately north of the proposed power block in the location where the cooling towers would be located for the proposed project. The ACC would appear as a large elevated box-like structure and would range from 98 to 120 feet in height. The ACC fans would be at least double the height of any of the proposed components of the GSEP (GSEP 2009a). As such, the ACC would be prominently visible. The ACC facilities would have a much stronger industrial character due to greater structural complexity and highly metallic coloration and texture. However, the ACC fans would be located approximately 1,800 feet from the project fenceline and would be surrounded by the solar trough fields.

Project Operation Impacts

Because of the increase in height by incorporating the ACC fans into the GSEP, there would be an increase in visual contrast, project dominance, and view blockage caused by the ACC structures when compared to views with the proposed wet-cooling system. However, in staff's opinion this difference would be meaningfully evident mainly from middle-ground KOPs, and not background distance zone KOPs. From middle-ground KOPs, including KOPs 1 and 4A, the structure would present increased vertical form, line and color contrast. This increase would tend to draw the eye of casual viewers to a greater degree than the Proposed Project structures. However, even at these middle-ground distances (3 miles and 3.7 miles respectively) the difference in vertical form contrast would not be so great as to qualitatively increase the overall level of visual change. The most noticeable component of increased structure contrast, particularly from KOP 1 and the highway generally, would be from color contrast if the ACC were light-colored or metallic, thus contrasting against the darker mountain background and drawing viewers' attention. With staff-recommended Condition of Certification VIS-1, Surface Treatment of Non-Mirror Project Structures, and Condition of Certification VIS-6, Reduction of Form, Line, and Texture Contrast, potential form, color, line, and texture contrast could be minimized to make the ACC blend in value with the dark mountain background. With this measure, overall project contrast would be reduced, the structure would be less likely to draw the attention of casual viewers, and overall visual change would remain moderate. Visual change of the alternative would be somewhat greater than the Proposed Project but would remain moderate and less-than-significant.

Apart from the change in structure contrast due to the increased height of the ACC compared to proposed structures, impacts of the Dry Cooling Alternative would remain largely as described for the Proposed Project. Potential glare impacts would be identical to the Proposed Project. Impacts from the proposed gen-tie line would remain the same. Therefore, staff recommends adoption of all Conditions of Certification as under the Proposed Project. With these measures, visual impacts of the Dry Cooling Alternative would be less-than-significant. There would be no visible vapor plumes under this alternative due to the replacement of wet cooling with dry cooling. Although visible plumes from the Proposed Project were found by staff to fall below Energy Commission thresholds of visual impact significance, the complete elimination of any visible plumes by air-cooling would represent a notable and desirable overall visual improvement compared to the Proposed Project.

Project Construction Impacts

Project construction impacts would be substantially the same as under the Proposed Project.

C.12.6.3 CEQA LEVEL OF SIGNIFICANCE

A. Would the project have a substantial adverse effect on a scenic vista?

No specific designated scenic vista locations were identified in the project viewshed. However, as discussed above, BLM considers that a primary purpose of the CDCA is to recognize and conserve the natural beauty and scenic recreational qualities of the California Desert. As described above, various KOPs with high levels of viewer concern for scenic values would be affected by the project, including motorists on Highway I-10, and visitors to the Palen McCoy Wilderness Area. These effects would be substantially similar under the Dry Cooling Alternative compared to the Proposed Project. Structure contrast would be higher due to the ACC structure, but this increase is considered to be mitigable with color treatment. Visible vapor plumes would be eliminated, representing an improvement over the Proposed Project. Because visual effects under the Proposed Project were considered to be mitigable to less-than-significant levels, and because overall impacts of the Dry Cooling Alternative would be substantially similar with recommended mitigation, substantial adverse effects on scenic views are not anticipated under this alternative.

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

The project is adjacent to Highway I-10, which is not listed as an eligible State Scenic Highway. No notable scenic features or resources are present on-site. The project would not directly damage any specific scenic resources located within the project site. Potential effects on scenic resources within the project viewshed in general are discussed under Item C, below.

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

As described in the main analysis above, the project could degrade the existing visual character and quality of views from Highway I-10 and the Palen McCoy Wilderness. These effects would be substantially similar to those under the Proposed Project. Structure contrast would be higher due to the ACC structure, but this increase is considered to be mitigable with color treatment. Visible vapor plumes would be eliminated, representing an improvement over the Proposed Project. Because visual effects under the Proposed Project were considered to be mitigable to less-than-significant levels, and because overall impacts of the Dry Cooling Alternative would be substantially similar with recommended mitigation, this alternative is not expected to substantially degrade the existing visual character or quality of the surroundings.

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

As under the Proposed Project, reflected glare would accentuate project contrast and thus increase aesthetic impact. Potentially affected receptors would include motorists on I-10 and at Wiley's Well Rest Area, and visitors to the Palen McCoy Wilderness. Under the Dry Cooling Alternative these effects would be substantially the same as under the Proposed Project. Consequently, as under the Proposed Project, with staff-recommended Condition VIS-4, this impact is considered mitigable to a less-than-significant level.

Night lighting/light pollution impacts would be substantially the same as under the Proposed Project. Consequently, as under the Proposed Project, with staff-recommended Condition VIS-2, this impact is considered mitigable to a less-than-significant level.

C.12.7 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 Genesis Solar Energy Project application and on CDCA land use plan amendment

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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. As a result, the views of the site are not expected to change noticeably from existing conditions under this alternative and, therefore, this No Project/No Action Alternative would not result in adverse visual, light, and glare impacts at this location. 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 Genesis Solar Energy Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 will be developed with another solar technology. As a result, it is possible that views of the site could change substantially based on the required buildings and structures on the site for the different solar technologies. Different solar technologies would create different visual effects based on the technology components. It is expected that the views of the site could change substantially with a different solar technology, similar to the changes in views under the proposed project. Therefore, this No Project/No Action Alternative could result in adverse visual, light, and glare impacts similar to the impacts under the proposed project.

No Project/No Action Alternative #3:

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

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 so no solar projects can be 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, the views of the site are not expected to change noticeably from existing conditions under this alternative and, therefore, this No Project/No Action Alternative would not result in adverse visual, light, and glare impacts. 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.12.8 CUMULATIVE IMPACTS

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 Figure 1** 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 Chuckwalla Valley viewshed, as shown on **Cumulative Impacts Figure 2, I-10 Corridor 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 I-10 Corridor 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 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.

GEOGRAPHIC SCOPE OF ANALYSIS

Cumulative impacts could occur if implementation of the Genesis Solar Project would combine with those of other local or regional projects. The Genesis Solar Project is potentially associated with two types of cumulative impact:

1. cumulative impacts within the immediate, local project viewshed, essentially comprising foreseeable future projects in the Chuckwalla Valley;

2. cumulative impacts of foreseeable future solar and other renewable energy projects within the southern California Colorado (Sonoran) Desert, or other broad regional basin of the project's affected landscape type. The widest applicable basin of cumulative effect would include all of the southern California desert, or the Sonoran and Mojave desert landscapes extending into neighboring states. This analysis, focusing on reqional effects of renewable projects only, is considered appropriate because the potential cumulative contribution of all other types of permissible development within this region is comparatively minor, and is dwarfed by the potential cumulative effect of renewable projects.

Local Projects (Project Viewshed)

Effects of Past and Present Projects

For this analysis, the following projects or developments are considered most relevant to effects on visual resources:

- Interstate 10 (I-10) (**Cumulative Table 2, item 1**)
- Chuckwalla and Ironwood State Prisons (**Cumulative Table 2, items 2 and 3**)
- Devers-Palo Verde Transmission Line (**Cumulative Table 2, item 4**)

Visual resources in the geographic area have been impacted by these past and currently approved projects as follows:

I-10 is an object of view from elevated KOPs in the Palen McCoy and Chuckwalla Wilderness Areas (WAs). It is also the viewshed's principal KOP, introducing large numbers of motorists into the area, many with relatively high scenic expectations and sensitivity. The two state prisons named are visible to the south of the highway within the same viewshed as the proposed project, but at a distance that renders them visually very subordinate. As such, the visual interaction between the project and these prisons is relatively weak. Similarly, the existing Devers-Palo Verde Transmission Line is visible within the same viewshed south of the highway, but tends to blend with its visual background, and is sufficiently distant as to remain visually subordinate. Together, these existing projects have the effect of rendering the Chuckwalla Valley south of I-10 less visually intact than the views northward toward the project site and the Palen-McCoy Wilderness. However, taken together they are not so intrusive as to substantially detract from the moderately high overall sensitivity of the viewshed.

Effects of Reasonably Foreseeable Future Projects

Visual resources are also expected to be affected by the following reasonably foreseeable future projects as follows:

- Devers-Palo Verde 2 Transmission Line Project (**Cumulative Table 2, item D**)
- Blythe Energy Project Transmission Line (**Cumulative Table 2, item F**)
- Palen Solar Power Project (**Cumulative Table 2, item K**)

Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction. The construction of the Genesis Solar Energy Project is expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the Genesis Solar Energy Project. As a result, there may be substantial short-term impacts during construction of those cumulative projects related to visual resources.

The Genesis Solar Energy Project would be expected to contribute only a small amount to the possible short-term cumulative construction impacts related to visual resources because the principal anticipated construction impacts of the Genesis project are related to the transmission line construction laydown area near the Wiley's Well rest

area. It is unlikely that the construction activities of the other named projects would occur within the same vicinity, so the likelihood of their visual interaction appears low.

Operation. The operation of the Genesis Solar Energy Project is expected to result in long-term adverse impacts during operation of the project related to visual resources. It is expected that some of the cumulative projects described above may be operational at the same time as the Genesis Solar Energy Project. As a result, there may be substantial long-term impacts during operation of those cumulative projects related to visual resources. The addition of the two proposed transmission lines in the same general corridor as the existing Devers-Palo Verde line have the potential to raise the cumulative level of contrast and dominance of the overall transmission corridor to a level that begins to attract attention and detract from the intactness and visual quality of the viewshed as seen from I-10. The project, through its proposed transmission line, would contribute incrementally to that increase in dominance of transmission lines within the Chuckwalla Valley.

Direct visual interaction of the Genesis and Palen power projects is expected to be relatively weak due to distance, and to the relatively subordinate level of dominance of the Genesis project as seen from I-10. The two projects would both be visible from viewpoints in a small portion of the Palen Mountains at background distances, although not in the same views, since they would be located in different directions (southwest and southeast, respectively). Both projects would be visible from KOP 3 (Corn Springs Road/Campground); the Palen Project would be visible at middle-ground distance from Corn Springs Road, and from about 6 miles from Corn Springs Campground. The Genesis Project would also be visible at background distance in those views. The Genesis Project would contribute incrementally to a small degree to that impact, which could potentially be substantial from some portions of Corn Springs Road and the Chuckwalla Wilderness. The anticipated operational visual impacts of the Genesis Solar Project in combination with past and foreseeable future projects in the local viewshed of Chuckwalla Valley are thus considered potentially significant from some sensitive viewpoints, particularly within the Chuckwalla Wilderness.

Decommissioning. The decommissioning of the Genesis Solar Energy Project is expected to result in adverse impacts related to visual resources similar to construction impacts. Although decommissioning of the Palen and Genesis projects could conceivably overlap in time, particularly when considering the long period involved in restoration of such disturbed sites in the desert, the cumulative contribution of the Genesis project to these effects from KOP 3 and similar sensitive local cumulative viewpoints is expected to be minor due to distance and moderate anticipated level of contrast. Consequently, the impacts of the decommissioning of the Genesis Solar Energy Project would not be expected to contribute substantially to local cumulative viewshed impacts.

Regional Solar/Renewable Development Projects

Effects of Past and Present Projects

The Genesis Solar Project is among the first of a large number of existing renewable project applications in the southern California desert. As such, past and present projects have had a negligible region-wide cumulative impact.

Effects of Reasonably Foreseeable Future Projects

The analysis of cumulative impacts is not necessarily restricted to the immediate viewshed of a project, and the need for cumulative analysis over a broad geographic area may often be determined by the affected resource itself. In this case the affected resource is the unique and highly valued landscape type of which the project site forms a small part – the landscape of the southern California and Sonoran Desert. The Sonoran Desert and California Desert Conservation Area (CDCA) within which the Genesis Solar Project is located are a unique and highly valued scenic resource of national importance, as reflected by the presence of three national parks and numerous Wilderness Areas within the CDCA boundaries. Cumulative Impacts Table 1 identifies 63 solar projects and 62 wind project applications with a total overall area of over one million acres within the CDCA, which is indicative of the interest in, and potential impact on, public lands for renewable energy generation at a regional level. This figure does not include renewable projects within the Nevada and Arizona portions of the Sonoran and Mojave Deserts. Of the 62 wind applications in the California Desert District, only five of the applications are for wind development; the remaining proposals are for site testing and monitoring. BLM's experience is that a small percentage of applications for site testing have resulted in wind development proposals. In regards to the solar applications filed with BLM in California, only approximately 10 percent of the proponents have prepared acceptable detailed Plans of Development required by BLM to begin a NEPA analysis.

Although it is not likely that all of the future solar and wind development projects proposed in the region would be constructed, it is reasonable to assume that some of them will. With this very high number of renewable energy applications currently filed with BLM, the potential for profound widespread cumulative impacts to scenic resources within the southern California desert is clear. These cumulative impacts could include a substantial decline in the overall number and extent of scenically intact, undisturbed desert landscapes, and a substantially more urbanized character in the overall southern California desert landscape. In particular, the number of current renewable applications before the BLM and Energy Commission that could potentially be prominently visible from the desert region's major highways is proportionally high. Likewise, the cumulative length of potentially affected highways also appears proportionately high. Because these highways are the location from which the vast majority of viewers experience the California desert, this potential effect is of concern to staff. Viewed in the cumulative context of the Southern California desert region as a whole, potential visual impacts of renewable energy projects are thus considered to be cumulatively considerable and potentially significant.

Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction. Cumulative construction impacts of renewable projects on a regional basis would be expected to be similar to the cumulative operation impacts, only less extensive, and short-term.

Operation. The cumulative operational impacts renewable projects on a regional landscape basis would be as described above. That is, there is a potential for a regional decline in the overall number and extent of scenically intact, undisturbed desert landscapes, particularly as experienced from the region's major highways and

roadways, and thus a more urbanized character in the overall southern California desert landscape. Among the foreseeable renewable applications, the Genesis Project would have a smaller contribution to this effect than many projects because of its limited exposure to views from the highway and middle-ground viewpoints in the adjoining wilderness. Nevertheless, these individually minor effects could be considered cumulatively considerable when viewed together on a regional basis.

Decommissioning. Cumulative regional decommissioning impacts of the Genesis Solar Energy Project together with other foreseeable renewable projects could result in adverse impacts related to visual resources similar to construction and operation impacts. That is, decommissioning impacts of many projects could overlap in time due to the long recovery period required for disturbed desert landscapes. Impacts from disturbed, decommissioned sites could thus become a substantial region-wide cumulative one, though eventual recovery would be anticipated over the long term due to anticipated conditions for decommissioning of the individual projects. In the very long term, potential decommissioning impacts would thus be expected to be mitigated.

Cumulative Impact Conclusion

The anticipated operational visual impacts of the Genesis Solar Project in combination with past and foreseeable future projects in the local viewshed of Chuckwalla Valley are considered potentially significant from some sensitive viewpoints, particularly within the Chuckwalla Wilderness. Anticipated cumulative operational impacts of past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable and potentially significant.

C.12.9 COMPLIANCE WITH LORS

VISUAL RESOURCES Table 3
Project Compliance with Laws, Ordinances, Regulations, and Standards (LORS)

LORS		**Consistency with Staff-Recommended Conditions of Certification (Project)**
FEDERAL		
National Environmental Policy Act (NEPA)	As discussed above, the analysis conducted in this assessment is considered by staff to be consistent with BLM environmental review requirements under NEPA as well as CEQA.	
Federal Land Policy and Management Act of 1976 (FLPMA)	Section 102 (a) of the Federal Land Policy and Management Act of 1976 (FLPMA) states that " . . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological,	Refer to CDCA discussion, below.

	environmental, air and atmospheric, water resource, and archeological values …. " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will... minimize damage to the scenic and esthetic values...."	
California Desert Conservation Area Plan (CDCA Plan)	The CDCA Plan represents the Resource Management Plan (RMP) for the area required under FLPMA. The CDCA Plan did not contain VRM mapping as in most RMPs. However, VR Inventory mapping and Interim VRM Classes were assigned to the study area prior to this project by BLM. In staff's opinion, the analysis in this assessment is consistent with the VRI mapping and IVRM Class mapping previously conducted, although the VRM methodology was not utilized. The Genesis Solar Project site is classified in the CDCA Plan as Multiple-Use Class (MUC) M (Moderate Use). Multiple-Use Class M calls for "a	Consistent. Solar electrical generation plants are specifically allowed for under the MUC Class M Guidelines if NEPA requirements are met. Disclosure of potential visual project effects under NEPA has been conducted through the analysis in this study. In general, BLM considers viewer sensitivity (in the VRM usage of the term) throughout the CDCA as High, due to the primary importance given to scenic values under the main goals of the CDCA Plan. In staff's opinion, the analysis in this assessment reflects view through a high level of assumed viewer concern within the Energy Commission

	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 to mitigate damage to those resources which permitted uses may cause." "The goal of the(CDCA) Plan is to provide for the use of the public lands, and resources of the California Desert Conservation Area, including economic, educational, scientific, and recreational uses, in a manner which enhances wherever possible—and which does not diminish, on balance—the environmental, cultural, and *aesthetic* values of the Desert and its productivity." Under the CDCA Plan Electrical Power Generation Facilities, including Wind/Solar facilities, may be allowed within MUC Class M if NEPA requirements are met.	methodology.
STATE		
State Scenic Highway Program (CA. Streets and Highways Code, Section 260 et seq.)	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform with requirements of the State program.	Consistent. Highway I-10 within the project viewshed is not an eligible or designated State scenic highway. To become eligible would require listing by act of the state legislature. Eligibility is a pre-requisite to state designation.
LOCAL		
Riverside County	**Multipurpose Open Space**	The project is located entirely

General Plan (2003) Related Multipurpose Open Space Element	**Element** Scenic Resources Policies: OS 21.1 Identify and conserve the skylines, view corridors, and outstanding scenic vistas within Riverside County. (AI 79) Scenic Corridors Policies: OS 22.1 Design developments within designated scenic highway corridors to balance the objectives of maintaining scenic resources with accommodating compatible land uses. (AI 3) OS 22.2 Study potential scenic highway corridors for possible inclusion in the Caltrans Scenic Highways Plan. OS 22.3 Encourage joint efforts among federal, state, and County agencies, and citizen groups to ensure compatible development within scenic corridors	on BLM lands and is thus not subject to County General Plan jurisdiction. The following related policies are provided for background purposes: The County has not yet mapped or listed specific view corridors or vistas for protection. I-10 is identified as a County eligible scenic corridor in the General Plan Circulation Element (Figure C-9). However, there are no designated state or county scenic highways within the project viewshed. As stated above, state designation requires listing of a road segment as an eligible State Scenic Highway by an act of the state legislature (California Streets and Highways Code, Division 1, Chapter 2, Article 2.5, Section 261). Again, there are no designated scenic corridors within the project viewshed.

C.12.10 NOTEWORTHY PUBLIC BENEFITS

No noteworthy public benefits in the area of visual resources were identified.

C.12.11 CONCLUSIONS

Staff have analyzed visual resource-related information pertaining to the proposed Genesis Solar Project and conclude that the proposed project, with all staff-recommended conditions of certification, would have adverse but less-than-significant visual impacts.

Impacts of the Reduced Acreage Alternative, with staff-recommended conditions of certification, would also have less-than-significant visual impacts. However, the degree and extent of those impacts would be substantially less than those of the Proposed Project.

Impacts of the Dry Cooling Alternative, with staff-recommended conditions of certification, would be substantially similar to the Proposed Project and would also have less-than-significant visual impacts. The Dry Cooling Alternative could be somewhat superior to the Proposed Project due to a lower incidence of visible vapor plumes.

The anticipated visual impacts of the Proposed Project, Reduced Acreage, and Dry Cooling Alternatives, in combination with past and foreseeable future local projects in the Chuckwalla Valley, and past and foreseeable future region-wide projects in the southern California desert are considered cumulatively considerable and potentially significant.

All action alternatives studied, with staff-recommended conditions of certification, would conform with all applicable Laws, Ordinances, Regulations and Standards (LORS).

C.12.12 MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION/APPROVAL

SURFACE TREATMENT OF NON-MIRROR PROJECT STRUCTURES AND BUILDINGS

VIS-1 The project owner shall treat all non-mirror surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with the existing dark brown color of the background bajadas and mountain slopes as seen from the highway or, in the case of foreground transmission poles, the lighter tan color of the valley floor; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive. This measure shall include coloring of security fencing with vinyl or other non-reflective coating; or with slats or similar semi-opaque, non-reflective material, to blend to the greatest feasible extent with the background soil.

The project owner shall submit for CPM review and approval, a specific Surface Treatment Plan that will satisfy these requirements. The treatment plan shall include:

A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completion of the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by the CPM. Subsequent modifications to the treatment plan are prohibited without CPM approval.

Verification: At least 90 days prior to specifying to the vendor the colors and finishes of the first structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to the CPM for review and approval and simultaneously to Riverside County for review and comment. If the CPM determine that the plan requires revision, the project owner shall provide to and the CPM a plan with the specified revision(s) for review and approval by the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to the CPM for review and approval.

Prior to the start of commercial operation, the project owner shall notify the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit to each one set of electronic color photographs from the same key observation points identified in (d) above. The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

TEMPORARY AND PERMANENT EXTERIOR LIGHTING

VIS-2 To the extent feasible, consistent with safety and security considerations, the project owner shall design and install all permanent exterior lighting and all temporary construction lighting such that a) lamps and reflectors are not visible from beyond the project site, including any off-site security buffer areas; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; d) illumination of the project and its immediate vicinity is minimized, and e) the plan complies with local policies and ordinances. The project owner shall submit to the CPM for review and approval and simultaneously to

the County of Riverside for review and comment a lighting mitigation plan that includes the following:

A. Location and direction of light fixtures shall take the lighting mitigation requirements into account;

B. Lighting design shall consider setbacks of project features from the site boundary to aid in satisfying the lighting mitigation requirements;

C. Lighting shall incorporate fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

D. Light fixtures that are visible from beyond the project boundary shall have cutoff angles that are sufficient to prevent lamps and reflectors from being visible beyond the project boundary, except where necessary for security;

E. All lighting shall be of minimum necessary brightness consistent with operational safety and security; and

F. Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied. To the greatest feasible extent, project lighting shall be used on an 'as needed' basis and turned off at other times.

Verification: At least 90 days prior to ordering any permanent exterior lighting or temporary construction lighting, the project owner shall contact the CPM to discuss the documentation required in the lighting mitigation plan. At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to the CPM for review and approval and simultaneously to the County of Riverside for review and comment a lighting mitigation plan. If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM.

The project owner shall not order any exterior lighting until receiving CPM approval of the lighting mitigation plan.

Prior to commercial operation, the project owner shall notify the CPM that the lighting has been completed and is ready for inspection. If after inspection, the CPM notify the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify the CPM that the modifications have been completed and are ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted the CPM within 30 days.

RE-ALIGNMENT AND VISUAL MITIGATION OF PROPOSED TRANSMISSION INTERCONNECTION

VIS-3 To reduce the prominence of the proposed new segment of transmission line paralleling Highway I-10, the applicant shall set back the transmission line at least 1/2 mile from Highway I-10 if possible. In addition, to reduce contrast and prominence of the transmission line, lattice-style transmission towers shall be utilized, and painted in non-reflective natural tones to blend with the visual background. Re-alignment of the transmission line shall be consistent with any cultural or biological constraints identified in those portions of this Staff Assessment/DEIS. In the event of conflict, cultural or biological constraints shall prevail.

Verification: At least 90 days prior to start of construction, the project owner shall present the CPM a revised plan showing the location of the transmission line and depicting scaled architectural elevations of lattice transmission towers to be used. If the CPM determine that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM.

The project owner shall not begin construction until receiving CPM approval of the revised plan.

REFLECTIVE GLARE MITIGATION

VIS-4 In order to reduce brightness of spread reflections of the sun to off-site viewers, the perimeter chain link fencing proposed by Applicant shall include opaque privacy slats of a minimum 8 feet in height. The slats shall be of a dark tan or earth-tone color selected to blend with the visual background of the site.

Verification: At least 90 days prior to start of construction, the project owner shall present to the CPM a glare mitigation plan describing the fencing measures and materials proposed for mitigating off-site glare. The plan shall include color samples of slatted fencing proposed for use. If the CPM determine that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM.

The project owner shall not begin construction until receiving CPM approval of the revised plan.

Within 48 hours of receiving a glare complaint, the project owner shall provide the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to the CPM within 30 days.

VISUAL MITIGATION AND RE-VEGETATION OF STAGING AREA

VIS-5 In order to minimize the visual prominence of the proposed staging area to visitors at Wiley's Well Rest Area on I-10, the project owner shall provide a revised site plan for staging that includes screening of the proposed laydown

area with earth berms, opaque fencing, and/or other measures to minimize visibility from within the main rest area, and restoration and revegetation of the laydown area after completion of construction. The revised staging plan shall be consistent with any cultural or biological resource constraints identified elsewhere in this Staff Assessment/DEIS. Restoration shall include re-grading to original contours in order to appear natural and undisturbed; revegetation shall employ appropriate locally native species only, again in accordance with conditions identified in the cultural and biological resource analyses of this report. The project owner shall provide a re-vegetation plan describing how the staging site will be restored following construction. The plan shall call for beginning of restoration of the site within the shortest feasible time following completion of construction.

Verification: At least 90 days prior to start of construction, the project owner shall present to the CPM a revised staging area site plan. If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM. The project owner shall not begin construction until receiving CPM approval of the revised plan.

At least 60 days prior to start of operation, the project owner shall present to the CPM a revegetation plan for the staging area. If the CPM determine that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM. The project owner shall not begin operation until receiving CPM approval of the revised plan.

REDUCTION OF FORM, LINE, AND TEXTURE CONTRAST

VIS-6 To the extent possible, the project owner will use applicable design principles to reduce the visual contrast of the project with the characteristic landscape. These include proper siting and location; reduction of visibility; repetition of form, line, color (see VIS-1) and texture of the landscape; and reduction of unnecessary disturbance. Design strategies to address these fundamentals will be based on the following factors as applicable and feasible in this case:

Earthwork: Select locations and alignments that fit into the landforms to minimize the size of cuts and fills. Avoid hauling in or hauling out of excess earth cut or fill. Avoid rounding and/or warping slopes. Avoid soil types that generate strong color contrasts. Reduce dumping or sloughing of excess earth and rock on downhill slopes.

Vegetation Manipulation: Retain as much of the existing vegetation as possible.

Structures: Minimize the number of structures and combine different activities in one structure. Use natural, self-weathering materials and chemical treatments on surfaces to reduce color contrast. Use natural appearing forms to complement the characteristic landscape. Screen the structure from view by using natural land forms and vegetation.

Reclamation and Restoration: Reduce the amount of disturbed area and blend the disturbed areas into the characteristic landscape. Replace soil, brush, rocks, and natural debris over disturbed area.

Verification: As early as possible in the site and facility design, the project owner shall meet with the CPM to discuss incorporation of these above factors into the design plans. At least 90 days prior to construction, the project owner shall contact the CPM to review the incorporation of the above factors into the final facility and site design plans. If the CPM determine that the site and facility plans require revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM.

C.12.13 REFERENCES

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APPENDIX VR-1

STAFF'S VISUAL RESOURCES EVALUATION METHODOLOGY

Staff evaluates the visual characteristics of the existing physical setting, the proposed project, the circumstances affecting the viewer, and the degree of visual change that a proposed project may introduce using the elements generally accepted criteria for determining substantial environment impact significance identified below.

ELEMENTS OF THE METHODOLOGY

Key Observation Points

Staff evaluates the existing visible physical environmental setting from a fixed vantage point, called a *key observation point* (KOP) that provides a view of the visual change introduced by the proposed project to the view from that KOP. The view as seen from the KOP is referred to as the *viewshed*. Staff uses a KOP[1] to represent a location(s) from which to conduct detailed analyses of the proposed project and to obtain existing condition photographs and prepare photo simulations. KOPs are selected to be representative of the most critical viewshed locations from which the project would be seen. Because it is not feasible to analyze all the views in which a proposed project would be seen, it is necessary to select a KOP that would most clearly display the visual effects of the proposed project. A KOP may also represent primary viewer groups that would potentially be affected by the project. In addition to KOP photo(s), staff reviews landscape character photos that help provide a visual overview of a project site, its vicinity, and the selected KOP area, as appropriate. Prior to application submittal, staff participates in the selection of appropriate KOP(s) for the analysis.

LORS Consistency

Energy Commission staff considers federal, state, and local laws, ordinances, regulations, and standards (LORS) relevant to aesthetics or protection and preservation of visual sensitive resources. Conflicts with such LORS can constitute significant visual impacts. For example, visual staff examines land use planning documents, such as a local government's General Plan, Specific Plan, and zoning ordinances applicable to the project site and surrounding area to gain insight as to the type of land uses intended for the area, and the guidelines given for aesthetics, or protection and preservation of visual sensitive resources.

California Environmental Quality Act Guidelines

The CEQA Guidelines define a "significant effect on the environment" to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance" (California Code of Regulations, Title 14, section 15382).

[1]The use of KOPs or similar view locations is common in visual resource analysis. The U.S. Bureau of Land Management (USDI BLM 1986a, 1986b, 1984) and the U.S. Forest Service (USDA Forest Service 1995) use such an approach.

Appendix G Environmental Checklist Form of the CEQA Guidelines, under “Aesthetics,” lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

A. Would the project have a substantial adverse effect on a scenic vista?

B. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Staff answers each of the four checklist questions for the proposed project, including any related facility such as a transmission line or gas pipeline, for both construction and operation phases.

Visible Water Vapor Plume Frequency

When a proposed power plant is operated at times of low temperature and highhumidity, the potential exists for the exhaust from its cooling towers to condense and water vapor plumes (steam plume). The formed plume potentially could have an adverse effect on visual sensitive resources in the vicinity of the project.

The severity of the visual impacts created by a project’s visible plumes depends on fivefactors: 1) the frequency of the plumes, 2) the physical size of the plumes (dimensions), 3) the sensitivity of the viewers who would see the plumes, 4) the distance between the plumes and the viewers, 5) the visual quality of the existing viewshed; and, 6) whether a scenic resource or vista would be blocked by the plumes.

Staff completes water vapor plume modeling of the proposed project’s cooling towers using design parameters provided by the applicant. Staff models the estimated plume frequency and dimensions for the cooling tower and turbine exhaust using the Combustion Stack Visible Plume (CSVP) model, and a multi-year meteorological data set obtained for the area where the project is proposed.

dimensions on which to base its visual impact analysis. The 20th percentile plume is the smallest of the plumes that are predicted to occur zero to 20% of the time. Eighty (80) percent of the time the dimensions of the clear hour plumes would be smaller than the 20th percentile plume dimensions. A one percentile clear hour plume would be extremely large, very noticeable to a wide area, but would occur very infrequently.

Staff focuses its frequency of the plumes analysis on the portion of the year when the ambient conditions (i.e., cool/cold temperatures and high relative humidity) are such that plumes are most likely to occur (typically from November through April) and when “clear” sky conditions exist because this is when the plumes would cause the most visual contrast with the sky and have the greatest potential to cause adverse visual impacts. Staff eliminates from consideration plumes that occur at night or during rain or

fog conditions because plume visibility, and overall visual quality, is typically low during those conditions. In addition, plumes that occur during specific cloudy conditions are also eliminated because under these conditions, plumes have less contrast with the background sky. A plume frequency of 20% of seasonal daylight no rain/fog high visual contrast (i.e. “clear”) hours is used to determine potential plume impact significance. If it is determined that the seasonal daylight clear hour plume frequency is greater than 20%, then plume dimensions are determined and a significance analysis is included in the Visual Resources section of the Staff Assessment for the proposed project.

Plume frequencies of less than 20% have been determined to generally have a less than significant impact. If the modeling predicts seasonal daylight clear plume frequencies greater than 20%, staff calculates the dimensions of the clear hour plumes and then conduct an assessment of the visual change (in terms of contrast, dominance and view blockage) that would be caused by the 20th percentile plume dimensions. Staff also analyzes the predicted plume’s potential luminescence (light refraction resulting in a glare or glow) and color contrast, and opacity (the degree to which light is prevented from passing through an emission plume) that may be introduced to the KOP view sheds. Considering the visual sensitivity of the existing landscape and viewing characteristics, the degree of visual change caused by the plumes may result in a significant visual impact.

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Appendix VR-2: Visible Plume Modeling Analysis

William Walters

INTRODUCTION

The following provides the assessment of the Genesis Solar Project (Genesis) cooling tower exhaust stack visible plumes. Staff completed a modeling analysis for the applicant's proposed unabated cooling tower design.

PROJECT DESCRIPTION

The proposed project is a thermal solar design that requires cooling to condense the steam that is recycled. The applicant has proposed two seven-cell mechanical-draft cooling towers for project cooling. The applicant has not proposed to use any methods to abate visible plumes from the cooling towers.

The applicant has also proposed two small (30 MMBtu/hr) boilers that will be used for daily start-up and for freeze protection. Each of these boilers will be operated for a maximum of 14 hours per day, and 1,000 hours per year. During cold weather periods, such as their use during start-up and for freeze protection in winter these boilers are likely to have visible plumes. However, due to their very small size the boiler plumes are not believed to create a potentially significant visual impact and are not assessed further in this analysis.

VISIBLE PLUME MODELING METHODS

PLUME FREQUENCY AND DIMENSION MODELING

The Combustion Stack Visible Plume (CSVP) model was used to estimate plume frequency and plume dimensions for the cooling tower exhaust. This model provides conservative estimates of both plume frequency and plume size. This model uses hourly cooling tower exhaust parameters and hourly ambient condition data to determine the plume frequency. This model is based on the algorithms of the Industrial Source Complex model (Version 2), that determine temperatures at the plume centerline, but this model does not incorporate building downwash.

The modeling method combines the cooling tower cell exhausts into an equivalent single stack. This method may overestimate cooling tower plume size (particularly height) during plume hours with higher winds perpendicular to the length of the tower due to little cell interaction and the potential for building downwash, but will be more accurate during low wind and calm periods when the exhausts from the cooling tower cells will combine into one coherent body. Wind speeds are set to 1 m/s during calm hours in the modeling analysis.

CLOUD COVER DATA ANALYSIS METHOD

A plume frequency of 20 percent of seasonal (November through April) daylight high visual contrast (i.e. “clear”) hours is used to determine potential plume impact significance. The methodology used to determine high visual contrast hours is provided below:

> The Energy Commission has identified a “clear” sky category during which visible plumes have the greatest potential to cause adverse visual impacts. For this project the meteorological data set[2] used in the analysis categorizes sky cover in 10 percent increments. Staff has included in the “Clear” category a) all hours with sky cover equal to or less than 10 percent plus b) half of the hours with total sky cover 20-90 percent. The rationale for including these two components in this category is as follows: a) visible plumes typically contrast most with sky under clear conditions and, when total sky cover is equal to or less than 10 percent, clouds either do not exist or they make up such a small proportion of the sky that conditions appear to be virtually clear; and b) for a substantial portion of the time when total sky cover is 20-90 percent the opacity of sky cover is relatively low (equal to or less than 50 percent), so this sky cover does not always substantially reduce contrast with visible plumes; staff has estimated that approximately half of the hours meeting the latter sky cover criteria can be considered high visual contrast hours and are included in the “clear” sky definition.

If it is determined that the seasonal daylight clear hour plume frequency is greater than 20 percent then plume dimensions are calculated, and a significance analysis of the plumes is included in the Visual Resources section of the Staff Assessment.

COOLING TOWER VISIBLE PLUME MODELING ANALYSIS

COOLING TOWER DESIGN AND OPERATING PARAMETERS

The cooling tower design characteristics were determined through a review of the applicant’s AFC (Genesis 2009a), the air quality and visible plume modeling files (Darvin 2010a), and additional data provided by the applicant to estimate daily and seasonal cooling tower operations (Tetra Tech 2010a, Worley Parsons 2010a). The applicant’s cooling tower physical design parameters are presented in **Visible Plume Table 1**.

[2] This analysis uses meteorological data provided by the applicant. Three years of meteorological data (1989-1991) are collected from the Blythe monitoring station.

Visible Plume Table 1
Cooling Tower Physical Design Parameters

Parameter	Cooling Tower Design Parameters
Number of Cells per Tower	7 Cells (Linear Design)
Cell Height	45.3 feet (13.81 meters)
Cell Stack Diameter	31.6 feet (9.64 meters)
Tower Housing Length	294.7 feet (89.8 meters)
Tower Housing Width	42.7 feet (13.01 meters)

Source: GSEP 2010a

The applicant provided estimated average heat load data for each hour of each month (Tetra Tech 2010a), as shown in **Visible Plume Table 2**. All hours not shown in this table are assumed to have zero cooling load. The applicant provided assumptions on the numbers of cells in operation based on percentage of full heat load (Worley Parsons 2010a). Using this data staff estimated the number of cells in operation for each hour of each month, as shown in **Visible Plume Table 3**.

Visible Plume Table 2
Cooling Tower Average Heat Load per Hour for Each Month

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7:00	---	---	---	23%	49%	59%	37%	22%	---	---	---	---
8:00	---	---	44%	68%	88%	97%	80%	70%	62%	44%	20%	---
9:00	26%	38%	79%	87%	91%	97%	86%	81%	86%	71%	50%	26%
10:00	45%	52%	79%	88%	94%	96%	85%	86%	88%	72%	53%	44%
11:00	46%	49%	79%	88%	91%	96%	93%	85%	87%	70%	52%	44%
12:00	47%	45%	77%	89%	92%	65%	92%	83%	86%	69%	50%	41%
13:00	49%	42%	76%	92%	92%	96%	87%	87%	83%	73%	53%	44%
14:00	52%	47%	80%	92%	91%	97%	90%	88%	83%	79%	57%	50%
15:00	58%	55%	76%	81%	90%	96%	88%	88%	81%	79%	60%	56%
16:00	54%	66%	74%	79%	89%	94%	90%	87%	82%	72%	41%	46%
17:00	---	30%	60%	67%	79%	85%	82%	74%	61%	18%	---	---
18:00	---	---	---	---	34%	54%	49%	30%	15%	---	---	---

Source: Tetra Tech 2010a

Visible Plume Table 3
Number of Operating Cooling Tower Cells

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7:00				3	5	6	5	3				
8:00			5	6	7	7	7	6	6	5	3	
9:00	4	5	7	7	7	7	7	7	7	7	5	4
10:00	5	6	7	7	7	7	7	7	7	7	6	5
11:00	5	5	7	7	7	7	7	7	7	7	6	5
12:00	5	5	7	7	7	6	7	7	7	6	5	5
13:00	5	5	7	7	7	7	7	7	7	7	6	5
14:00	6	5	7	7	7	7	7	7	7	7	6	5
15:00	6	6	7	7	7	7	7	7	7	7	6	6
16:00	6	6	7	7	7	7	7	7	7	7	5	5
17:00		4	6	6	7	7	7	7	6	3		
18:00					4	6	5	4	2			

Source: Staff Interpolation based on cooling tower average heat load per hour of each month (Tetra Tech 2010a) and the number of cells in operation corresponding to the percentage of heat load, provided by the applicant (Worley Parsons 2010a).

The cooling tower operation for this project is significantly different than the dozens of cooling towers evaluated for siting cases from 2001 to present. Specifically, the heat rejection load to the cooling tower is specifically related to the sun angle (time of day and year) that impacts the total power production capacity of the facility. Therefore, the cooling tower operation starts at low heat rejection loads each morning and building until the afternoon when the heat rejection load drops as the sun sets. Staff has attempted to mimic, in a simple and conservative way, the complex operating profile of the cooling tower exhaust modeling inputs. Additionally, the hourly cooling tower exhaust conditions are interpolated for the hourly ambient conditions (temperature and relative humidity) based on the assumed heat rejection for each operating cooling tower cell.

COOLING TOWER VISIBLE PLUME MODELING RESULTS

Visible Plume Table 5 provides the CSVP model visible plume frequency results for daytime operations using a three-year (1989 to 1991) meteorological data set compiled from the Blythe monitoring station.

Visible Plume Table 5
Predicted Hours with Cooling Tower Visible Plumes
Blythe 1989-1991 Meteorological Data

Case	Available (hr)	Plume (hr)	Percent
All Hours	26,280	1,189	4.52%
Daylight Hours	13,425	903	6.73%
Daylight No Rain No Fog	13,260	848	6.39%
Seasonal Daylight No Rain No Fog*	5,967	689	11.50%
Seasonal Daylight Clear*	4,145	395	10.75%

*Seasonal conditions occur during November through April.

The results noted above are based on the data and assumptions shown in **Visible Plume Tables 2** through **4**, and do not include night time operation as the heat load for the cooling tower is a function of the solar radiation.

A visible plume frequency of 20 percent of seasonal (November through April) daylight clear hours is used as a plume impact study threshold trigger, therefore plume dimension modeling and additional impact analysis for the cooling tower visible plumes is not required for this project.

APPLICANT'S PLUME ANALYSIS

The applicant prepared a plume modeling analysis using the Seasonal/Annual Cooling Tower Impact (SACTI) model. Due to the way the SACTI model over simplifies the modeling by only allowing one operating case to be modeled at a time and its grouping of the hourly meteorological data into a couple dozen cases, among a few other significant issues, staff does not use this model for plume frequency and size prediction.

Staff did not find any significant issues with the applicant's SACTI model inputs (Darvin 2010a). However, the applicant's SACTI modeling analysis conservatively assumed high heat rejection and cooling tower cell use for all hours, which would over predict cooling tower plume frequency and size. Therefore, staff has not compared the applicant's plume modeling results with staff's CSVP plume modeling results.

GROUND FOGGING ANALYSIS

Staff also reviewed the applicant's ground fogging modeling results, which is part of the output from the applicant's SACTI modeling analysis. Using very conservative operating assumptions, ground fogging was predicted to occur less than two hours during the three years of meteorological data modeled, and only extend 300 meters from the cooling tower. This is a very low frequency for ground fogging potential and there are no public roads that could be impacted with these ground fogging plumes. Therefore, the proposed project cooling towers would not cause ground traffic safety impacts on public roads.

CONCLUSIONS

Visible water vapor plumes from the proposed Genesis Solar cooling tower would not occur more than 20 percent of seasonal daylight clear hours. Therefore plume dimension modeling and additional impact analysis for the cooling tower visible plumes is not required for this project.

The ground fogging plume analysis indicates that the cooling tower will only create minimal hours of the ground fogging plume that would not impact any public roads. Therefore, there would be no impact on ground traffic safety.

Due to their small size and limited operation significant visible water vapor plumes are not expected from the two small Genesis auxiliary boilers.

REFERENCES

Darvin 2010a – Gregory Darvin, Atmospheric Dynamics, Inc. SACTI Modeling Files e-mailed to William Walters, Aspen Environmental Group. January 13, 2010.

Genesis 2009a – Genesis Solar LLC/R. O'Keefe (tn 53083). Application for Certification Vol 1& 2. Submitted to CEC/Docket Unit on 08/31/09.

Tetra Tech 2010a – Tetra Tech EC, INC./T. Bernhardt (tn 54729). Data Request Responses to Set 1B, dated 01/11/10.

Worley Parsons 2010a – Worley Parsons/Jared Foster. Supplemental Data Response to Data Requests Set 1B. Submitted January 20, 2010.

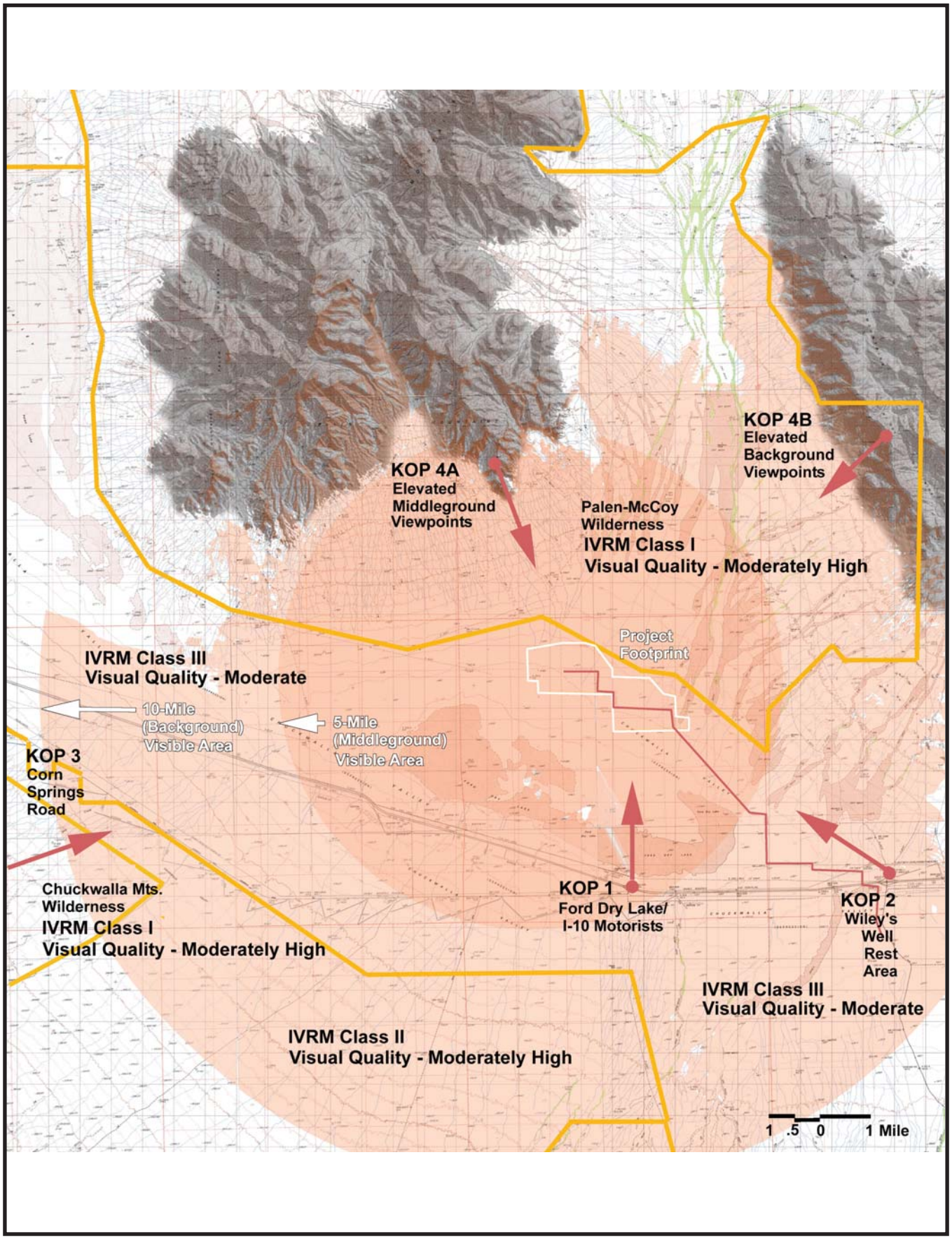
VISUAL RESOURCES - FIGURE 1

Genesis Solar Energy Project - Panoramic View of Site (Looking North from Ford Dry Lake Road Interchange)

SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 2

Genesis Solar Energy Project - Existing Landscape Setting, Project Viewshed, and Key Observation Points (KOPs)



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SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 3

Genesis Solar Energy Project - Visual Setting Photos

Dry Lake Bed

Ironwood Tree

Creosote Scrub

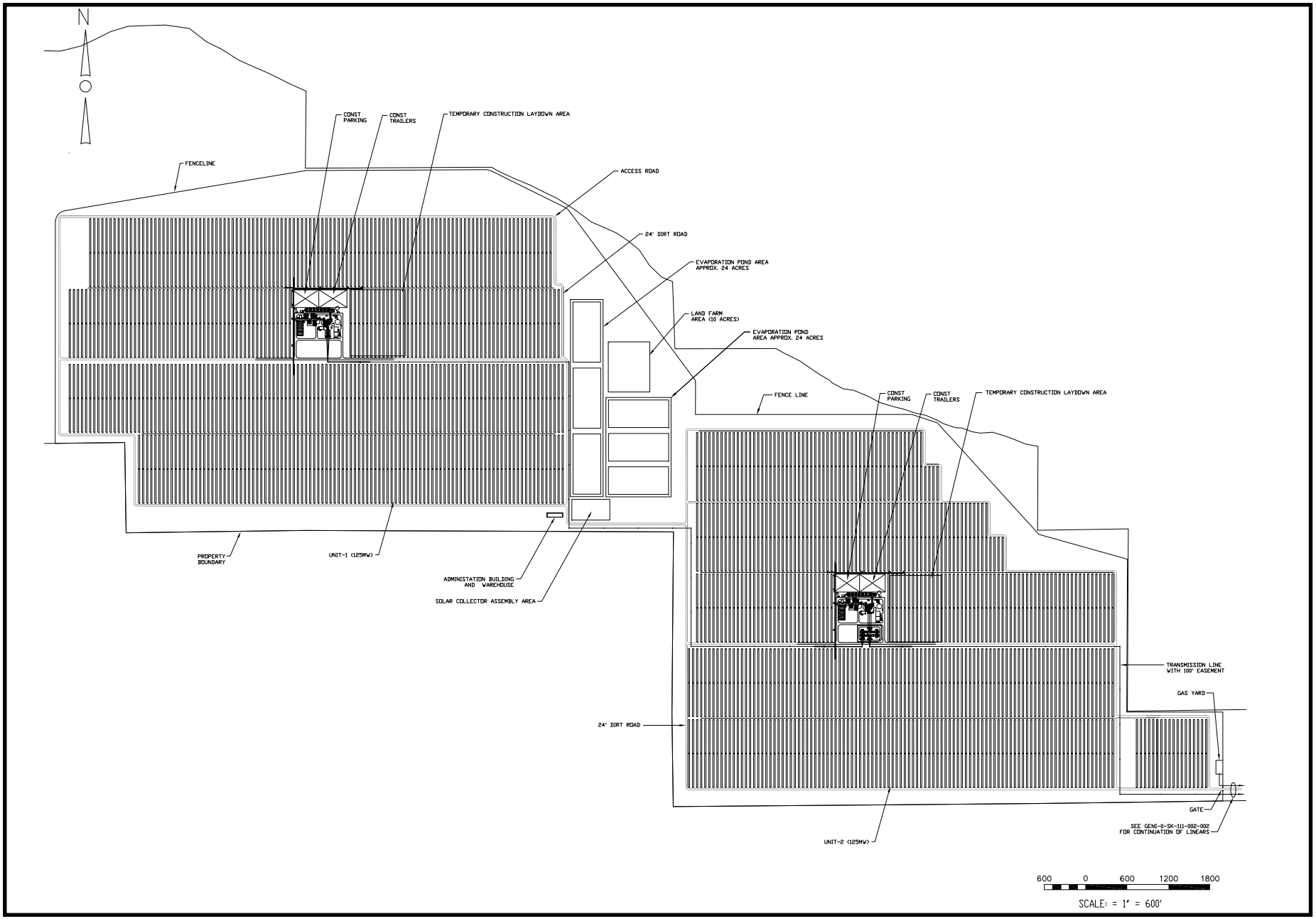
Chuckwalla and Ironwood Prisons, Looking South from Wiley's Well Road, I-10

Devers-Palo Verde Transmission Line, Looking Southwest from Wiley's Well Road

SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 4

Genesis Solar Energy Project - Project Layout



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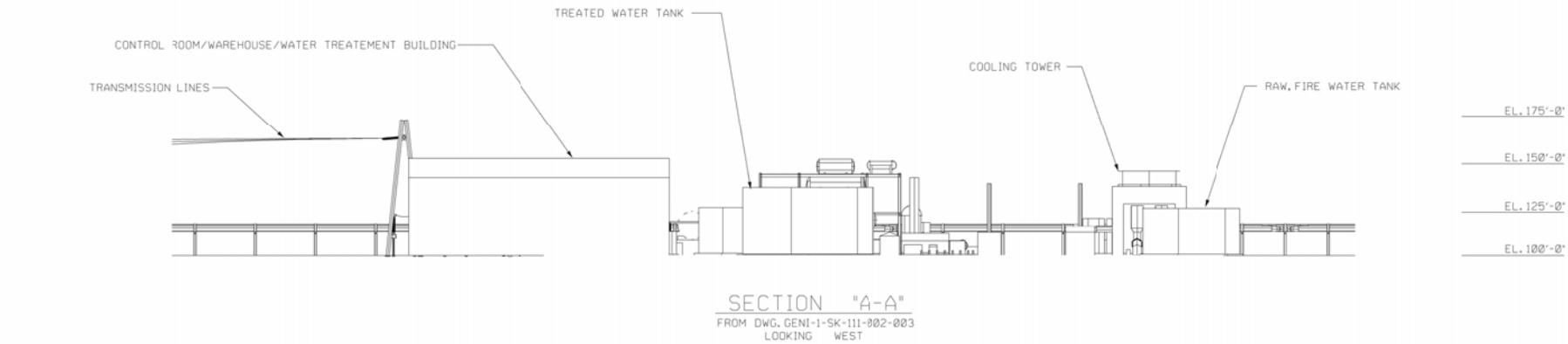
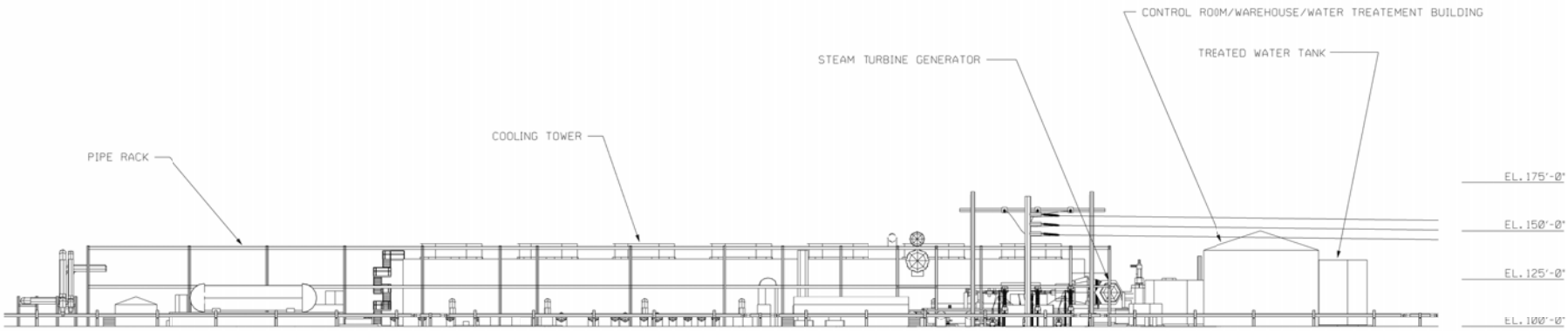
SOURCE: AFC 3.4-1

VISUAL RESOURCES - FIGURE 5

Genesis Solar Energy Project - Project Structure Elevations

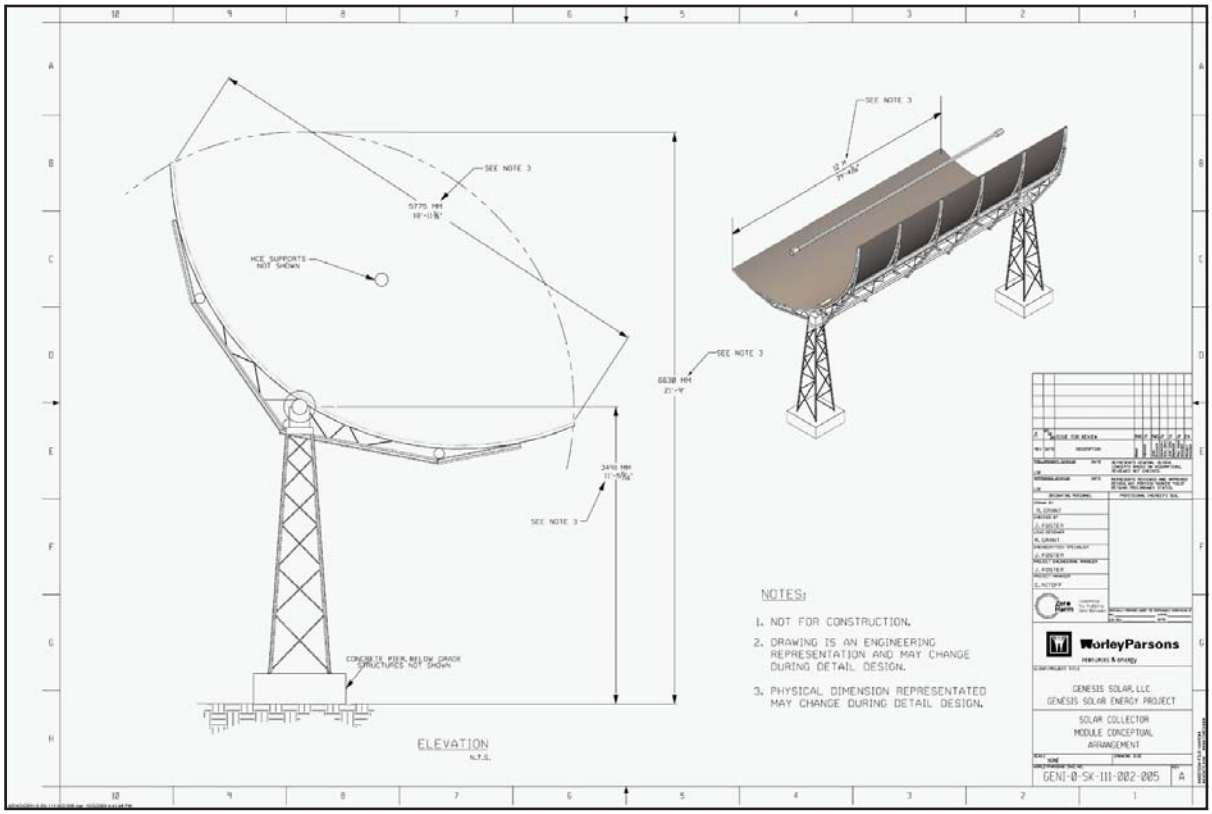




SOURCE: AFC 3.4-4

VISUAL RESOURCES - FIGURE 6

Genesis Solar Energy Project - Project Solar Collector Mirror Units

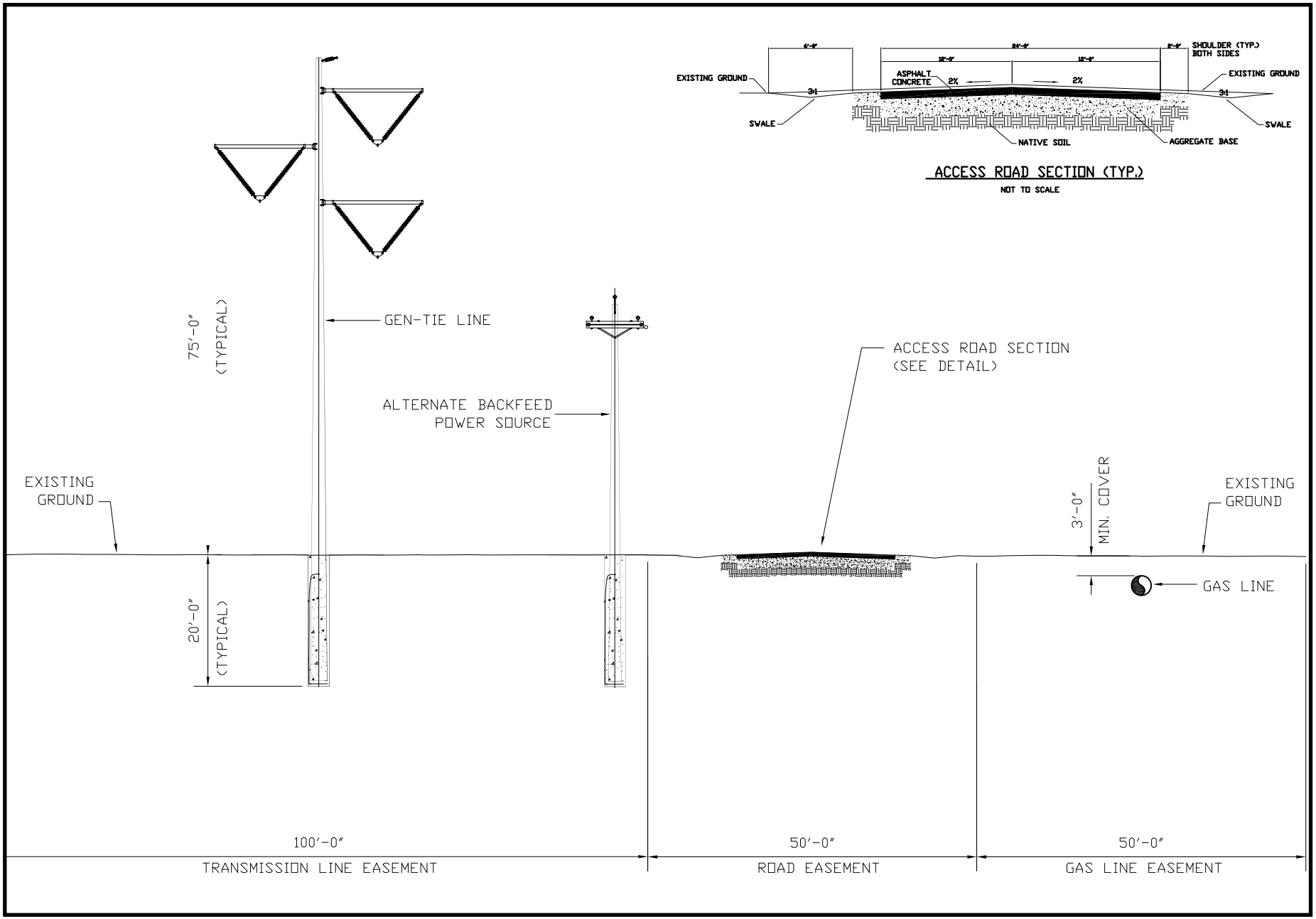


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 7

Genesis Solar Energy Project - Gen-Tie Transmission Line Pole Elevations



SOURCE: AFC 3.6-2

VISUAL RESOURCES - FIGURE 8A

Genesis Solar Energy Project - Existing Visual Conditions at KOP 1 (Ford Dry Lake Bridge over I-10)

SOURCE: AFC 5.10-15A

VISUAL RESOURCES - FIGURE 8B

Genesis Solar Energy Project - Visual Simulation of Phase 2 at KOP 1 (Ford Dry Lake Bridge over I-10)

SOURCE: AFC 5.10-15C

VISUAL RESOURCES - FIGURE 9A

Genesis Solar Energy Project - Existing Visual Conditions at KOP 2 (Wiley's Well Bridge over I-10)

SOURCE: AFC 5.10-16A

VISUAL RESOURCES - FIGURE 9B

Genesis Solar Energy Project - Visual Simulation of Phase 2 at KOP 2 (Wiley's Well Bridge over I-10)

SOURCE: AFC 5.10-16C

VISUAL RESOURCES - FIGURE 9C

Genesis Solar Energy Project - View of Project Gen-Tie Transmission Line Poles, Looking Northwest from Wiley's Well Road

SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 10A

Genesis Solar Energy Project - Existing Visual Conditions at KOP 3 (Corn Springs BLM Road)

SOURCE: AFC 5.10-17A

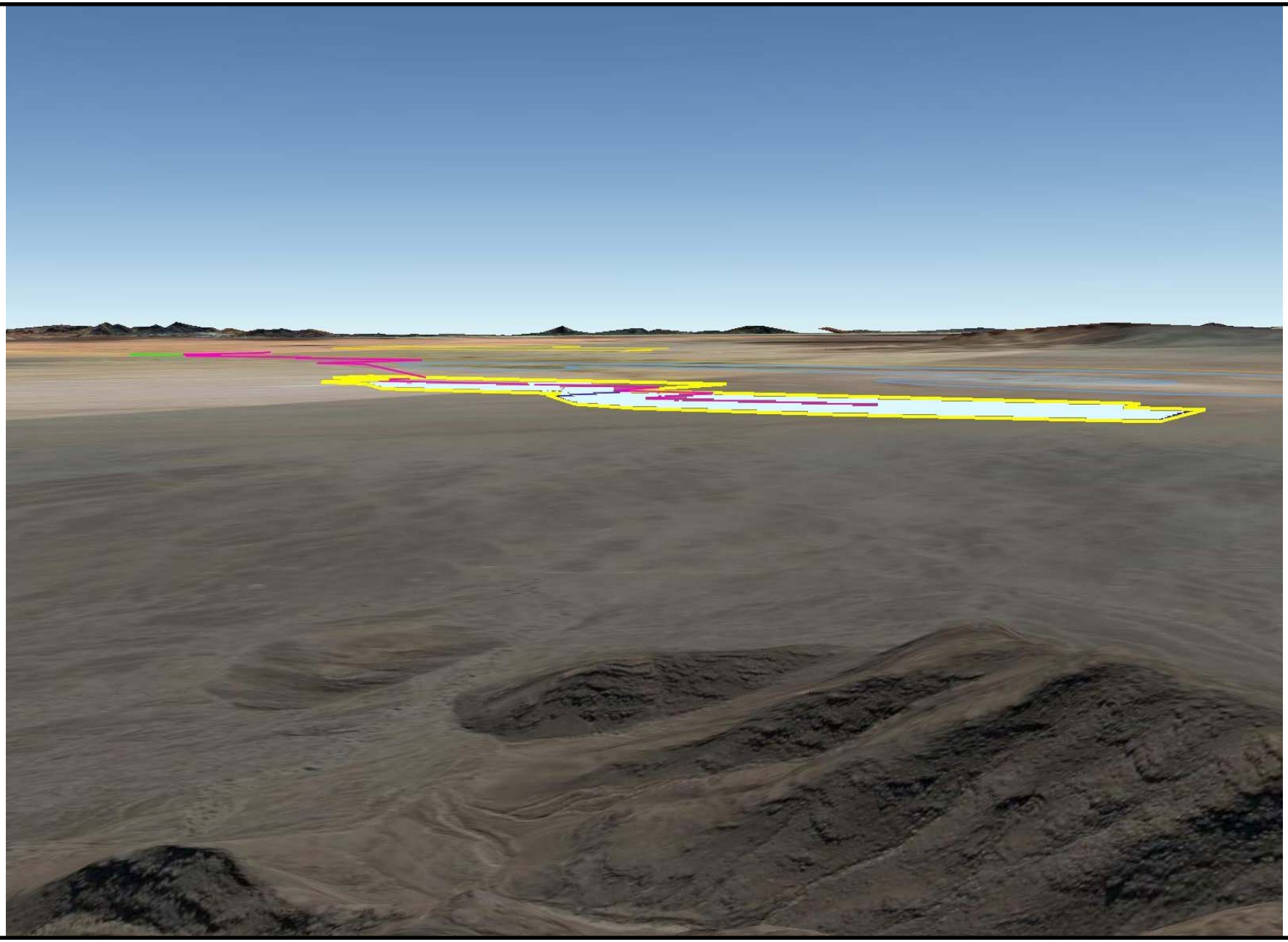
VISUAL RESOURCES - FIGURE 10B

Genesis Solar Energy Project - Visual Simulation of Phase 2 at KOP 3 (Corn Springs BLM Road)

SOURCE: AFC 5.10-17C

VISUAL RESOURCES - FIGURE 11A

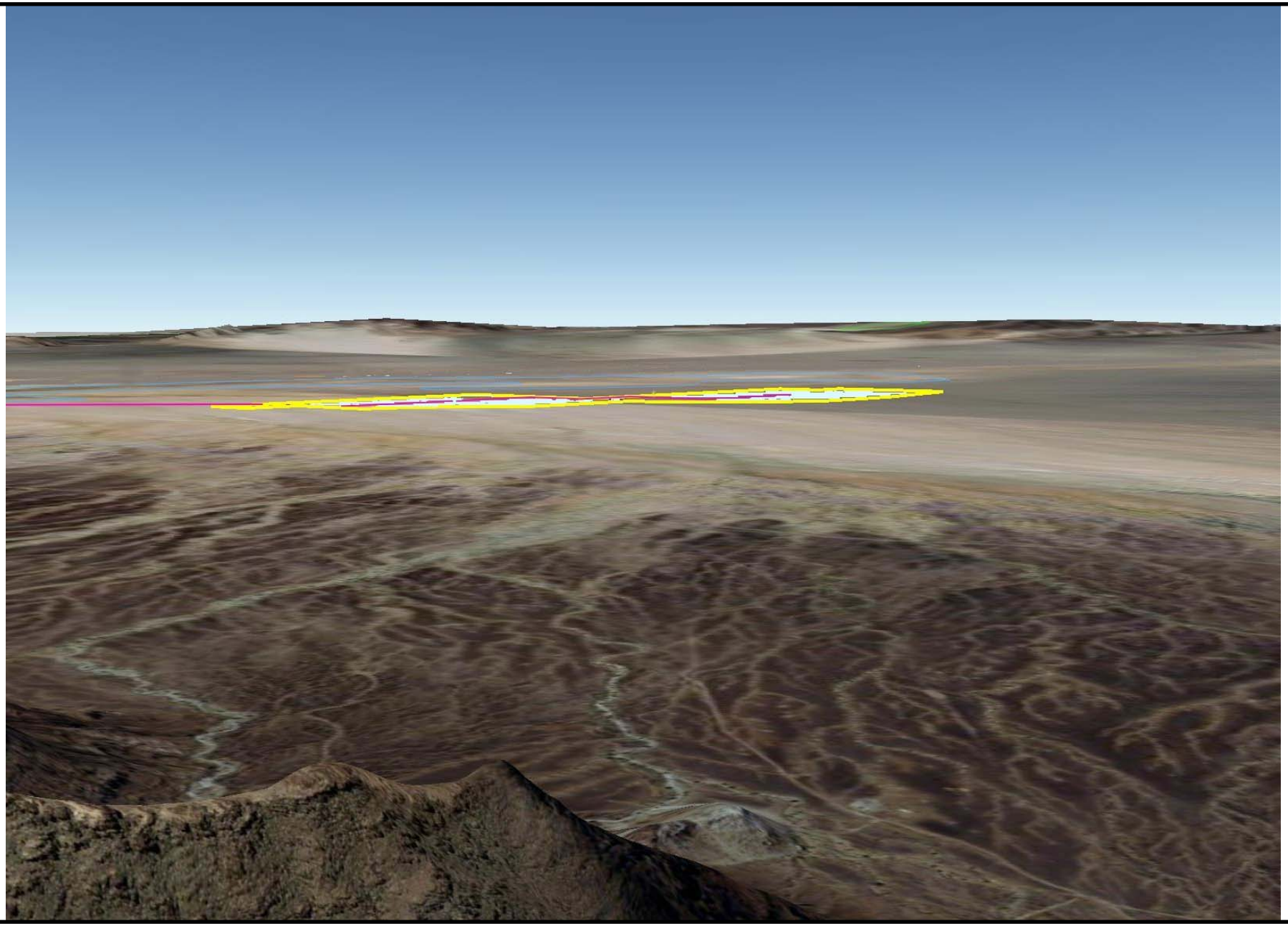
Genesis Solar Energy Project - Simulated View of Project Footprint from KOP 4A (Palen Mountains at Middleground Distance)



SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 11B

Genesis Solar Energy Project - Simulated View of Project Footprint from KOP 4B (McCoy Mountains at Background Distance)



SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 12

Genesis Solar Energy Project - Trough Project Examples (Aerial Views)

Unidentified trough project under different lighting conditions

Acciona Nevada Solar One

Acciona Nevada Solar One

SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 13A

Genesis Solar Energy Project - Trough Spread Glare at Kramer Junction

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: William Kanemoto

VISUAL RESOURCES - FIGURE 13B

Genesis Solar Energy Project - Trough Spread Glare at Nevada Solar One

SOURCE: William Kanemoto

C.13 - WASTE MANAGEMENT

Testimony of James Thurber

C.13.1 SUMMARY OF CONCLUSIONS

The California Energy Commission (Energy Commission) staff (staff) conclude that management of the waste generated during construction, operation, and closure/decommissioning of the Genesis Solar Energy Project (GSEP) would not result in any significant adverse impacts under CEQA or NEPA, and would comply with applicable waste management laws, ordinances, regulations, and standards if the measures proposed in the Application for Certification (AFC) and staff's proposed conditions of certification are implemented. Conditions of Certification referred to herein serve the purpose of both the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act (CEQA) and BLM's Mitigation Measures for purposes of the national Environmental Policy Act (NEPA).

C.13. INTRODUCTION

This Revised Staff Assessment (RSA) presents an analysis of issues associated with wastes generated from the proposed construction and operation of the GSEP. The technical scope of this analysis encompasses solid wastes existing on site and those to be generated during facility construction and operation. Management and discharge of wastewater is addressed in the **Soil and Water Resources** section of this document. Additional information related to waste management may also be covered in the **Worker Safety / Fire Protection** and **Hazardous Materials Management** sections of this Revised Staff Assessment document.

The Energy Commission staff's objectives in conducting this waste management analysis are to ensure that:

- the management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during the construction and operation of the proposed project would be managed in an environmentally safe manner.
- the disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities.
- during project construction, operation, and closure/decommissioning the site is managed in such a way that project wastes and waste constituents would not pose a significant risk to humans or the environment.

C.13.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of the 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, the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA (CEQ NEPA Regulations) 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. CEQA NEPA Regulations requires that an Environmental Impact Statement (EIS) be prepared when a proposed major 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 waste management (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

The following federal, state, and local environmental laws, ordinances, regulations, and standards (LORS) have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various LORS is a major component of staff’s determination regarding the significance and acceptability of the GSEP with respect to management of waste. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

WASTE MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Title 42, United States Code, §§ 6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation, and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing: • Generator record keeping practices that identify quantities of hazardous wastes generated and their disposition; • Waste labeling practices and use of appropriate containers; • Use of a manifest when transporting wastes; • Submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and • Corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills. RCRA is administered at the federal level by U.S. EPA and its 10 regional offices. The Pacific Southwest regional office (Region 9) implements U.S. EPA programs in California, Nevada, Arizona, and Hawaii.
Title 42, United States Code, §§ 9601, et seq. Comprehensive Environmental Response, Compensation and Liability Act	The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund, establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • Reporting requirements for releases of hazardous substances; • Requirements for remedial action at closed or abandoned hazardous waste sites, and brownfields; • Liability of persons responsible for releases of hazardous substances or waste; and • Requirements for property owners/potential buyers to conduct “all appropriate inquiries” into previous ownership and uses of the property to 1) determine if hazardous substances have been or may have been released at the site, and 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy

Applicable LORS	Description
	CERCLA “all appropriate inquiries” requirements.
Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. • Part 246 addresses source separation for materials recovery guidelines. • Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is an authorized state so most of the solid and hazardous waste regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.
Title 49, CFR, Parts 172 and 173 Hazardous Materials Regulations	U.S. Department of Transportation established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, Section 262.20.
Clean Water Act (CWA)	Controls discharge of wastewater to the surface waters of the U.S. Genesis Solar Energy Project will discharge sanitary wastewater to one onsite septic tank and leach field wastewater treatment system that will comply with CWA requirements.
State	
California Health and Safety Code, Chapter 6.5, §§ 25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.
Title 22, California Code of Regulations (CCR),	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes

Applicable LORS	Description
Division 4.5 Environmental Health Standards for the Management of Hazardous Waste	are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, CCR include: • Identification and Listing of Hazardous Waste (Chapter 11, §§ 66261.1, et seq.) • Standards Applicable to Generators of Hazardous Waste (Chapter 12, §§ 66262.10, et seq.) • Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §§ 66263.10, et seq.) • Standards for Universal Waste Management (Chapter 23, §§ 66273.1, et seq.) • Standards for the Management of Used Oil (Chapter 29, §§ 66279.1, et seq.) • Requirements for Units and Facilities Deemed to Have a Permit by Rule (Chapter 45, §§ 67450.1, et seq.) The Title 22 regulations are established and enforced at the state level by DTSC. Some generator standards are also enforced at the local level by CUPAs.
California Health and Safety Code, Chapter 6.11 §§ 25404– 25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground Storage Tank Program • Business Plan Program • California Accidental Release Prevention (CalARP) Program • Hazardous Material Management Plan / Hazardous Material Inventory Statement Program • Hazardous Waste Generator / Tiered Permitting Program • Underground Storage Tank Program The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as Certified Unified Program Agencies (CUPAs). Riverside County Department of Environmental Health is the area CUPA. Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program. Other elements of the Unified Program may be addressed in the **Hazardous Materials** and/or **Worker Health and Safety** analysis sections.

Applicable LORS	Description
Title 27, CCR, Division 1, Subdivision 4, Chapter 1, §§ 15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§ 15600–15620).
Public Resources Code, Division 30, §§ 40000, et seq. California Integrated Waste Management Act of 1989	The California Integrated Waste Management Act of 1989 (CIWMA) (as amended) establishes mandates and standards for management of solid waste. Among other things, the law includes provisions addressing solid waste source reduction and recycling, standards for design and construction of municipal landfills, and programs for county waste management plans and local implementation of solid waste requirements.
Title 14, CCR, Division 7, § 17200, et seq. California Integrated Waste Management Board	These regulations further implement the provisions of the California Integrated Waste Management Act and set forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal. • Chapter 3.5 – Standards for Handling and Disposal of Asbestos • Containing Waste. • Chapter 7 – Special Waste Standards. • Chapter 8 – Used Oil Recycling Program. • Chapter 8.2 – Electronic Waste Recovery and Recycling.
California Health and Safety Code, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989 (also known as SB 14).	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (~ 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a 4-year cycle, with a summary progress report due to DTSC every 4th year.
Title 22, CCR,	These regulations further clarify and implement the provisions of the

Applicable LORS	Description
§67100.1 et seq. Hazardous Waste Source Reduction and Management Review.	Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
Title 23, CCR Division 3, Chapters 16 and 18	These regulations relate to hazardous material storage and petroleum UST cleanup, as well as hazardous waste generator permitting, handling, and storage. The DTSC Riverside County CUPA is responsible for local enforcement.
California Fire Code	Controls storage of hazardous materials and wastes and the use and storage of flammable/combustible liquids. Waste will be accumulated and stored in accordance with Fire Code requirements. Permits for storage containers will be obtained, as needed, from the Riverside County Fire Department.
Local	
County of Riverside General Plan	The General Plan ensures all new development complies with applicable provisions of the County Integrated Solid Waste Management Plan. In addition, Safety Element, Policy S 6.1 describes the County's policies and siting criteria identified in the County of Riverside Hazardous Waste Management Plan including coordination of hazardous waste facility responsibilities on a regional basis through the Southern California Hazardous Waste Management Authority.
Riverside County Code Title 8 Chapters 8.60, 8.84, and 8.132, Health and Safety	Establishes requirements for the use, generation, storage, and disposal of hazardous and non-hazardous materials and wastes within the County.
Riverside County, Countywide Integrated Waste Management Plan	This document sets forth the county's goals, policies, and programs for reducing dependence on landfilling solid wastes and increasing source reduction, recycling, and reuse of products and waste, in compliance with the CIWMA. The plan also addresses the siting and development of recycling and disposal facilities and programs within the county.

C.13.4 PROPOSED PROJECT

C.13.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed GSEP site is approximately 4,640 acres of public land administered by the Bureau of Land Management (BLM). The project site is located in east Riverside County about 25 miles west of Blythe and 27 miles east of Desert Center. The completed site will occupy an estimated 1,800 acres at the main facility located approximately 4 miles north of Interstate 10 (I-10). An additional 90 acres of right-of-way is required for the linear facilities that extend south and east from the site to reach I-10; the transmission line will continue south of I-10 to connect with the Blythe Energy Project Transmission Line.

The Project is located in the central part of Chuckwalla Valley, an east-southeast trending valley that gently slopes southeast toward the Colorado River. The Project site lies on alluvial fans formed at the base of the Palen Mountains to the north and the McCoy Mountains to the east, and the eastern portion of the Project site is underlain by a broad valley-axial drainage that extends southward between these mountains and drains to the Ford Dry Lake playa located about one mile south of the Project site. The Project site is relatively flat and generally slopes from north to south with elevations of approximately 400 to 370 feet above mean sea level. The GSEP site is undeveloped desert with creosote and bursage scrub vegetation. The area has historically been used for both off-highway vehicle use and sheep grazing; however, neither activity currently occurs (GSEP 2009a). Historic military training is known to have occurred in the local area (General Patton's tank corps) and further east at Blythe Air Field.

The proposed project consists of two independent 125MW power blocks and solar collector fields designated Unit 1 and Unit 2. The two project power blocks and solar arrays will occupy about 1,360 acres. Physically between Unit 1 and Unit 2 will be two evaporation pond areas, a land treatment unit (LTU), and the administration and warehouse building. These areas along with access roads, ancillary facilities, and some open areas combine for the total 1,800 acre fenced area (GSEP 2009a). Construction parking, trailers, laydown areas, and solar collector assembly areas will be located within the project foot print.

The principal project elements include:

- Each solar collector field is made up of multiple single-axis-tracking parabolic trough solar collectors aligned on a north-south axis. Each solar collector has a parabolic-shaped reflector that focuses the sun's direct normal radiation on a receiver known as a heat collection element (HCE) located at the focal point of the parabola. The collectors track the sun from east to west during the diurnal cycle to ensure the sun is continuously focused on the HCE. The heat transfer fluid (HTF) is heated up to approximately 740°F as it circulates through the HCEs and returns to the solar steam generator (SSG) where the fluid is used to generate high-pressure steam. The north-south oriented multiple tracking parabolic solar collectors will occupy cover 1,360 acres.
- Each 125MW power block contains a solar steam generator (SSG), steam turbine generator (STG), wet cooling towers, natural gas-fired auxiliary boilers, HTF surge tanks, emergency diesel generators, raw and treated water storage tanks, demineralized waster storage tank, water treatment unit, and control/warehouse building.
- Two 24-acre double-lined (three 8-acre cells each) evaporation ponds for management of cooling tower blowdown water. The evaporation ponds will be permitted as Class II Surface Impoundments in accordance with requirements of the Colorado River Regional Water Quality Control Board (CRRWQCB) and the California Integrated Waste Management Board (CIWMB).
- One 10 acre land treatment unit (LTU) for bioremediation of HTF contaminated soil classified as non-hazardous (<10,000 mg/Kg). The unit will be designed and permitted as a Class II LTU in accordance with CRRWQCB and CIWMB requirements. Once the soil has been treated to a concentration of less than 100

mg/kg HTF, it will be moved from the LTU to another portion of the site until it is reused at the facility as fill material. Soil classified as hazardous (>10,000 mg/Kg HTF) will not be treated in the LTU but will be hauled to a Class I disposal facility.

- One on-site 230kV switchyard located near power block Unit 2 measuring 270 feet by 400 feet.
- An 8-mile long generation-tie (gen-tie) line will be routed in a southeasterly ROW eventually connecting to the proposed Southern California Edison (SoCal Edison) 500-230 kV Colorado River substation via the Blythe Energy Project Transmission Line (BEPTL).
- A 6-mile long natural gas supply line will serve the project from a SoCal Gas Company high-pressure pipeline located on the north side of I-10.
- On-site groundwater wells will supply the project and require on-site treatment consisting of a pre-treatment system upstream of the cooling tower, and a post-treatment system downstream of the cooling tower. Water treatment will include a multi-media filter (MMF) and two-stage reverse osmosis (RO) unit for pre-treatment upstream of the cooling tower. The waste stream from the MMF unit is discharged into the on-site evaporation ponds and the waste stream from the second RO unit is discharged into the wastewater storage tank. Post-treatment will also consist of an MMF and RO unit and the waste stream from the MMF and second RO unit will be discharged into the on-site evaporation ponds. Finally, treated water will be further processed through a mixed-bed demineralizer and used for the steam generator cycle and mirror washing.
- Approximately 26 miles of paved and unpaved site access roads.

Surrounding Area

The proposed project site is located in eastern Riverside County. The surrounding area consists of undeveloped desert land with the small rural community of Desert Center located 27 miles to the west and the larger city of Blythe located 25 miles to the east. Interstate 10 passes two miles south of the southernmost border of the project site and connects the project with the local communities.

The Palen/McCoy Wilderness Area lies adjacent to the north site boundary and the Ford Dry Lake lakebed is one mile to the south. The Ironwood and Chuckwalla State Prisons are located 9 miles southeast of the GSEP site.

C.13.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This waste management analysis addresses: a) existing project site conditions and the potential for contamination associated with prior activities on or near the project site, and b) the impacts from the generation and management of wastes during project construction and operation.

Existing Project Site Conditions and Potential for Contamination

For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of

hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, or sensitive species or environmental areas to be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered significant by Energy Commission staff.

As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[1] and submitted as part of an AFC. The Phase I ESA is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) on or near the site.

In general, the Phase I ESA uses a qualified environmental professional to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional then provides findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the environmental professional may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site.

In conducting its assessment of a proposed project, staff will review the project's Phase I ESA and work with the appropriate oversight agencies as necessary to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

Impacts from Generation and Management of Wastes during Construction, Operation and Project Closure/Decommissioning

Regarding the management of project-related wastes generated during construction, operation, and closure/decommissioning of the proposed project, staff reviewed the

[1] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

applicant's proposed solid and hazardous waste management methods and determined the methods proposed are consistent with the LORS identified for waste disposal and recycling. As mentioned previously, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management. Staff then reviewed the capacity available at off-site treatment and disposal sites and determined whether or not the proposed power plant's waste would impact the available capacity.

C.13.4.3 DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions

A Phase I ESA, dated August 2009, was prepared by Tetra Tech EC, Inc., in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs. The Phase I ESA addressed conditions on portions or most of 13 sections in Township 6 South, Range 19 East, and parts of four sections in Township 6 South, Range 20 East; the Phase I ESA is included as Appendix F of the project's AFC. The ESA did not identify any Recognized Environmental Conditions (RECs) in connection with historic or current site operations. A REC is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicate an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or in the ground, groundwater, or surface water of the property.

The 1,800 acre project site and 90 acres of linear access road consists of undeveloped BLM land only used for recreation. There are no existing roads, structures on the project site or adjoining lands. In addition, the site is not listed on the Environmental First Search (EFS) Site Information Report (GSEP 2009a, Appendix E).

No RECs were identified within the one-mile radius search of offsite areas. However, the project area was within General Patton's World War II (WWII) Desert Training Center, California-Arizona Maneuver Area region (1942 to 1944). The region surrounding the Project Area was considered a suitable location for training troops that would be deployed in the North Africa Campaign. After 2 years in operation and the training of one million troops, the desert training camps were closed in 1944. Military trash scatter including ration containers, military-issue utensils, and one 50-caliber cartridge were identified during the Tetra Tech site visits (GSEP 2009a, Appendix E). There is potential for unexploded ordnance (UXO) at the project site.

In the event that contamination is identified during any phase of construction, staff proposes Condition of Certification **Waste-1** requiring that any additional work must be conducted under the oversight of DTSC, with Energy Commission Compliance Project Manager (CPM) involvement. Furthermore, staff recommends proposed Conditions of Certification **Waste-2** and **Waste-3** be adopted to address any soil contamination

contingency that may be encountered during project construction. **Waste-2** would require that an experienced and qualified Professional Engineer or Professional Geologist be available for consultation in the event contaminated soil is encountered. If contaminated soil is identified, **Waste-3** would require that the Professional Engineer or Professional Geologist inspect the site, determine what is required to characterize the

nature and extent of contamination, and provide a report to the CPM and DTSC with findings and recommended actions.

Proposed Project

Proposed Project - Construction Impacts and Mitigation

Site preparation and construction of the proposed solar project and its associated facilities would last approximately 37 months and generate both non-hazardous and hazardous wastes in solid and liquid forms. Before construction can begin, the project owner will be required to develop and implement a Construction Waste Management Plan per proposed Condition of Certification **Waste-4** to ensure that the waste will be recycled when possible and properly landfilled when necessary. In addition, the project owner will be required to develop a UXO identification training and reporting procedures program per proposed Condition of Certification **Waste-5** to ensure site workers are properly trained to recognize, avoid, and report UXO. The UXO training program should include the identification of trained UXO ordnance experts that are available to complete removal of UXO and supplemental geophysical surveys to search for additional or buried ordnance.

Non-Hazardous Wastes

Construction activities would generate an estimated 40 cubic yards per week of non-hazardous solid wastes, consisting of scrap wood, steel, glass, plastic, and paper, and another 1 cubic yard per week of office-related waste. Of these items, recyclable materials would be separated and removed as needed to recycling facilities. Non-recyclable materials (insulation, other plastics, food waste, roofing materials, vinyl flooring and base, carpeting, paint containers, packing materials, etc.) would be disposed at a Class III landfill.

Non-hazardous liquid wastes would be generated during construction, and would include 200 gallons of sanitary waste per day. Sanitary wastes would be pumped to tanker trucks by licensed contractors for transport to a sanitary water treatment plant. Please see the **Soil and Water Resources** section of this document for more information on the management of project wastewater.

Hazardous Wastes

During construction, anticipated hazardous wastes include waste paint, spent construction solvents, waste cleaners, waste oil, oily rags, and waste batteries. Estimated amounts are 1 cubic yard of empty containers (per week), 175 gallons of oils, solvents, paint, and oily rags (every 90 days), and 10 batteries (per year). Empty hazardous material containers would be returned to the vendor or disposed at a hazardous waste facility; solvents, used oils, paint, oily rags, and adhesives would be recycled or disposed at a hazardous waste facility; and spent batteries would be disposed at a recycling facility. In addition, a one-time generation of 1,000 gallons of Heat Exchanger cleaning solvent (chelant type solution) would require disposal at a permitted hazardous waste facility (GSEP 2009a, pages 5.13-5).

The generation of hazardous waste requires a unique hazardous waste generator identification number. The hazardous waste generator number is determined based on

site location and therefore, both the construction contractor and the project owner/operator could be considered the generator of hazardous wastes at the site. Therefore, the project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction, pursuant to proposed Condition of Certification **Waste-6**. This would ensure compliance with California Code of Regulation Title 22, Division 4.5.

Hazardous waste would be collected in hazardous waste accumulation containers and stored in a laydown area, warehouse/shop area, or storage tank on equipment skids for less than 90 days. The accumulated wastes would then be properly manifested, transported, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods and concluded that all wastes would be disposed of in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by the proposed Condition of Certification **Waste-7** to notify the Compliance Project Manager (CPM) whenever the owner becomes aware of this action.

Staff has reviewed the proposed waste management methods described in AFC section 5.13.2.1, and in the responses to data requests, and concludes that project construction wastes would be managed in accordance with all applicable LORS. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management activities.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils, specific waste handling, disposal, or other precautions may be necessary pursuant to hazardous waste management LORS. Staff finds that proposed Conditions of Certification **Waste-1** through **-3** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would further support compliance with LORS.

Proposed Project - Construction and Demolition (C&D) Waste Diversion and Mitigation

The Integrated Waste Management Act of 1989 [Assembly Bill (AB) 939, Sher, Chapter 1095, Statutes of 1989] set landfill waste diversion goals of 50 percent (by 2000) for local jurisdictions. To meet this goal, many jurisdictions require applicants for construction and demolition projects to submit a reuse/recycling plan for at least 50 percent of C&D materials prior to the issuance of a building or demolition permit. The GSEP project is required to complete the Riverside County Waste Management Department (RCWMD) Construction and Demolition Waste Diversion Program Reporting Form C (GSEP 2009f, page WM-6). RCWMD and staff will require the applicant to meet the 50 percent waste diversion rate. Adoption of Condition of Certification **Waste-8** will ensure the GSEP owner meet the waste diversion goals of the C&D program. Staff believes that compliance with proposed Condition of Certification **Waste-8** would also help ensure that project wastes are managed properly and further reduce potential impacts to local landfills from project wastes.

Proposed Project - Operation Impacts and Mitigation

The proposed GSEP project would generate both non-hazardous, universal, and hazardous wastes in solid and liquid forms under normal operating conditions. Table 5.13-3 of the project AFC gives a summary of the anticipated operation waste streams, estimated waste volumes and generation frequency, and proposed management methods. Before operations can begin, the project owner would be required to develop and implement an Operations Waste Management Plan as required in the proposed Condition of Certification **Waste-9**. This would ensure that an accurate record is maintained of the project's waste storage, generation, and disposal, and compliance with waste regulations is maintained during operation.

Heat Transfer Fluid Releases

The GSEP would use Therminol VP-1™ (a synthetic oil consisting of diphenyl ether and biphenyl) for the heat transfer fluid (HTF). Approximately 2.0 million gallons of Therminol VP-1™ would be present within each unit's solar system, including the piping and necessary expansion tanks; no additional HTF would be stored on site (GSEP 2009a, page 5.12-6).

Occasional spills of HTF from either equipment failure or human error can result in the generation of contaminated soil. HTF spills typically spread laterally on the bare ground and soak down to a relatively shallow depth. The contaminated soil is regulated as a hazardous material by the State of California due to the constituent biphenyl. Biphenyl is listed in Title 22, CCR, Chapter 11 Appendix X (list #299) as an extremely hazardous waste. The listing of a chemical in Appendix X creates the regulatory presumption that a waste containing that chemical (i.e. HTF contaminated soil) is hazardous unless determined otherwise, pursuant to specified procedures. The determination is required to be based on criteria and lists in Title 22, California Code of Regulations, Section 66261.1 et seq., which identify hazardous wastes subject to regulation. DTSC made a 1995 determination that a 10,000 mg/kg concentration of HTF would be assumed hazardous for SEGS III-VI at Kramer Junction. This determination, however, cannot be extrapolated to the proposed project, and DTSC has indicated that determination of whether a discharge of HTF constitutes a hazardous waste would have to be made on a case by case basis (CEC 2009t). Once a history of discharges has been established, the applicant may petition DTSC for their concurrence on a standardized waste classification for HTF contaminated soils generated at the facility (title 22, CCR, section 66260.200(d)). Depending on DTSC findings an operator could modify their operations to standardize treatment and eliminate the need for case by case determinations.

Title 22, CCR, section 66260.200(f) places the responsibility of determining whether a waste must be classified as hazardous on the generator of that waste. The GSEP project owner would therefore be required to assess the waste classification for HTF-impacted soils at the GSEP facility in consultation with the CEC, DTSC, and Colorado River Basin Regional Water Quality Control Board (RWQCB).

The applicant estimates generating 750 cubic yards per year of soil contaminated with HTF which would be bioremediated or land farmed and 10 cubic yards that would sent for disposal at a permitted Class I landfill. Each of the two solar fields would share the same Land Treatment Unit (LTU) to bioremediate or land farm the contaminated soils

containing less than 10,000 mg/Kg. The LTU would be constructed with a clay liner at least five feet deep per Title 27 requirements; monitoring would be used to evaluate liner integrity (see **Soil and Water Resources** section).

The GSEP project owner would develop and implement an Operations Waste Management Plan which would include: a discussion of the appropriate frequency for characterizing HTF-contaminated soils; the level of HTF in soil that would be considered hazardous waste; and sampling and testing protocols for HTF-contaminated soils. In addition, the project owner would be required to document the project's actual operational waste stream and obtain approval for the Operations Waste Management Plan prior to the start of construction per proposed Condition of Certification **WASTE-9**. These measures would ensure that HTF-contaminated soils are treated in compliance with all LORS.

The applicant's proposed treatment and disposal methods are generally consistent with and would provide for compliance with the Requirements for Waste Discharge established by the Colorado River Basin and presented in **Soil and Water Resources**. Staff proposes Condition of Certification **WASTE-10** to address the Requirements of Waste Discharge. This would require the applicant to comply with the requirements for accidental discharges of HTF associated with the operation of the project and ensure that hazardous concentrations of contaminated HTF-soil will not be treated in the LTU. With implementation of Condition of Certification **WASTE-10** there would be no significant adverse impacts under CEQA due to HTF spills during project operation.

Non-Hazardous Solid Wastes

Non-hazardous solid wastes generated during project operations would consist of paper, wood, plastic, cardboard, deactivated equipment and parts, defective or broken electrical materials, empty non-hazardous containers, and other miscellaneous solid wastes. The GSEP AFC does not estimate the volume of these non-hazardous waste generated by the project; similar solar generating projects estimate approximately 10 cubic yards of non-hazardous solid waste per week (SES 2008a). GSEP estimates less than 10 spent household batteries per month, and approximately 50 spent fluorescent bulbs per year would be recycled (GSEP 2009a page 5.13-6). All non-hazardous wastes would be recycled to the greatest extent possible, and the remainder would be removed on a regular basis for disposal in a Class III landfill. Sanitary wastewater solids would be treated with an onsite septic system, and sludge would be delivered to an off-site disposal facility.

Soil may become contaminated with Heat Transfer Fluid (HTF) from spills and leaks within the HTF system. HTF concentrations in soil measured at <10,000 mg/Kg would be placed in the on site bioremediation land treatment unit (LTU), pending approval of the Department of Toxic Substances Control (DTSC) (GSEP 2009a page 5.13-8). On site treatment of contaminated soil may require a permit from DTSC and the project owner will initiate pre-application discussions and determine the permitting process applicable to the facility.

An estimated 750 cubic yards per year of contaminated soil would be remediated at the LTU with an irregular frequency (GSEP 2009a page 5.13-6). Following treatment and

confirmation sampling and laboratory testing documenting acceptable residual concentrations of HTF, the bioremediated soil will be reused as fill on the project site.

Non-hazardous solid waste will be periodically generated during maintenance of the water treatment filters. Replacement of the spent media (sand, gravel, garnet, anthracite) from the multi-media filters is estimated to produce 2100 cubic feet (78 cubic yards) every 5 years (GSEP 2009f page WM-3). Maintenance of the reverse osmosis filters would generate approximately 440 cartridges (2 inch diameter, 20 inch long) every few months and about 160 RO membrane elements (4 inch diameter by 40 inches long) every 3 to 5 years (GSEP 2009f page WM-3). These non-hazardous waste streams will be taken off site for recycling or disposal at a Class III landfill.

Approximately 50,000 tons of evaporative residue would be removed from the evaporation ponds every seven years or 214,500 tons during the 30-year project life (see also Non-Hazardous Liquid Wastes) (GSEP 2009a page 5.13-8). This material is anticipated to be non-hazardous solids, possibly requiring on-site dewatering before transport, consisting primarily of salt (sodium, chloride and sulfate) that would be disposed of at a Class II landfill facility (GSEP 2009a; GSEP 2009f page WM-4).

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated at the pre- and post- water treatment systems consisting of brine or high TDS water. During facility operation these liquid (brackish water) waste streams combine for an average flow of 182 gpm that would be sent to the RWQCB permitted 24-acre double-lined (three 8-acre cells each) evaporation ponds.

Hazardous Wastes

The project owner/operator would be considered the generator of hazardous wastes at the site during facility operations. Therefore, the project owner's unique hazardous waste generator identification number, obtained prior to construction in accordance with proposed Condition of Certification **Waste-6**, would be retained and used for hazardous waste generated during facility operation.

Hazardous wastes that may be generated during routine project operation include used hydraulic fluid, oils and grease (50,000 gallons per year) from the HTF system, turbine, and other hydraulic equipment, lead-acid batteries (10 per year), and oily rags, oily absorbent and spent oil filters (five 55-gallon drums per month) (GSEP 2009a, page 5.13-6). Plant washdown areas will generate an estimated 3,000 gallons per year of oily water from the oil-water separation system.

Soil contaminated with HTF measured at concentrations >10,000 mg/Kg is anticipated to be approved as Non-RCRA hazardous waste. An estimated 10 cubic yards per year of HTF contaminated soil (>10,000 mg/Kg) will require off site disposal at a Class I landfill (GSEP 2009a page 5.13-6; GSEP 2009f page WM-4 to WM-5).

In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or cleanup materials that may also require management and disposal as hazardous waste. Proper hazardous material handling

and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **Waste-11,** requiring the project owner/operator to document, clean up, and properly manage and dispose of wastes from any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. More information on project hazardous materials management spill reporting, containment, and spill control and countermeasures plan provisions for the project are provided in the **Hazardous Materials Management** section of this document.

The amount of hazardous wastes generated during the operation of the GSEP project would not be minor, however with source reduction and recycling of wastes implemented whenever possible the waste requiring Class I disposal would be small. The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed of at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **Waste-7** to notify the CPM when advised of any such action.

Proposed Project - Closure and Decommissioning Impacts and Mitigation

The closure or decommissioning of the GSEP project would produce both hazardous and non-hazardous solid and liquid waste. The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532, and are specifically detailed in **General Conditions**. The plan provides a means for assuring that the facility is constructed, operated and closed in compliance with public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission. Required elements of a facility's closure would be outlined in a facility closure plan as specified in Conditions of Certification **Compliance-11, -12** and **-13**. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the CPM) prior to commencement of closure activities. The facility closure plan will document non-hazardous and hazardous waste management practices including: the inventory, management, and disposal of hazardous materials and wastes, and permanent disposal of permitted hazardous materials and waste storage units.

The handling and management of waste generated by GSEP will follow the hierarchical approach of source reduction, recycling, treatment, and disposal as specified in California Public Resources Code Sections 40051 and 40196. The first priority of the project owner will be to use materials that reduce the waste that is generated. The next level of waste management will involve reusing or recycling wastes, particularly the disassembly and reuse/recycling of the parabolic trough components. For wastes that cannot be recycled, treatment will be used, if possible, to make the waste nonhazardous. Finally, waste that cannot be reused, recycled or treated would be

transported off site to a permitted treatment, storage, or disposal facility. Staff expects that there will be adequate landfill capacity available to dispose of both non-hazardous and hazardous waste from the closure or decommissioning of the proposed project. Conditions of Certification **WASTE-6** through **-11** would continue to apply to GSEP during closure or decommissioning of the project.

Proposed Project - Impact on Existing Waste Disposal Facilities

Non-Hazardous Solid Wastes

Construction and operation of the proposed project would respectively generate 40 cubic yards and 10 cubic yards per week of nonhazardous solid waste (wood, paper/cardboard, glass, plastic, insulation, and concrete), respectively. The waste would be stored onsite for less than 30 days, and then recycled or disposed of in a Class III landfill.

Table 5.13-1 of the project AFC identifies five waste disposal facilities in Riverside County (excluding Desert Center Landfill which is scheduled for closure in 2011) that could potentially take the non-hazardous construction and operation wastes generated by the GSEP project. The remaining combined capacity of the five landfill facilities that are expected to be operating in 2011 is over 160 million cubic yards. The total amount of non-hazardous solid waste generated from project construction is estimated to be 6,400 cubic yards (40 cubic yards per week for 37 months), and the total amount from lifetime operations is estimated to be 15,600 cubic yards (10 cubic yards per week for 30 years). These quantities include both recyclable and non-recyclable wastes; the non-recyclable component would contribute much less than 1 percent of the available landfill capacity. Staff finds that disposal of the solid wastes generated by the GSEP project can occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

AFC Table 5.13-1 lists landfills and recycling facilities that could be used to manage project wastes. Two hazardous waste (Class I) disposal facilities are currently accepting waste and could be used to manage GSEP wastes: the Clean Harbors Buttonwillow Landfill in Kern County and the Chemical Waste Management Kettleman Hills Landfill in Kings County. The Kettleman Hills facility also accepts Class II and Class III wastes. In total, there is a combined excess of 15.5 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with at least 28 to 30 years remaining in their operating lifetimes (EEC2006a, Section 8.14.3.5.2). In addition, the Kettleman Hills facility is in the process of permitting an additional 4.6 to 4.9 million cubic yards of disposal capacity (Waste Management 2009), and the Buttonwillow facility has 40 years to reach its capacity at its current disposal rate (CEC2008aa).

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. As calculated from waste streams presented in AFC Table 5.13-2 (GSEP 2009a), approximately 1550 cubic yards of recyclable and non-recyclable hazardous waste would be generated over the 37 month construction period. Less than 300 cubic yards of hazardous non-

recyclable waste would be generated over the 30-year operating lifetime. Thus hazardous wastes from the GSEP project requiring off-site disposal would be significantly less than the remaining capacity of either Class 1 waste facility.

C.13.4.4 CEQA Level of Significance

Absent any unusual circumstances, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

C.13.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would be a single solar field (Unit 1) of the proposed Genesis Solar Energy Project (GESP), resulting in a 125 MW solar facility located within the boundaries of the proposed project, as defined by the applicant (NextEra). This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area, so certain impacts are reduced, and (2) by eliminating the eastern solar field, which is located on flowing desert washes, impacts to the sand dune and playa areas and to the Mojave Fringe-toed Lizard habitat would be reduced. The alternative would also help reduce impacts to wildlife movement by reducing an obstruction to the Palen wash. Moreover, it would maintain, thru both fluvial and Aeolian processes, the dune and sandy habitats. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.13.5.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.13.5.2 Assessment of Impacts and Discussion of Mitigation

The Reduced Acreage Alternative would generate similar types of hazardous and non-hazardous wastes from construction, demolition and operation of the project. However, the quantities of waste would be reduced by approximately 50 percent. The location of the Reduced Acreage Alternative is the same as the proposed project and would be no closer to any unidentified RECs. Similar to the proposed project, staff will not require investigation and remediation of soil and groundwater contamination. Disposal methods would remain the same as for the proposed project and the same Conditions of Certification (**WASTE 1-10)** would apply. Smaller quantities of waste would require landfill or treatment; waste levels would remain well below 1 percent of expected disposal facility capacity.

C.13.5.3 CEQA Level of Significance

Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Reduced Acreage Alternative.

C.13.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f).

However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

C.13.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.13.6.2 Assessment of Impacts and Discussion of Mitigation

Wet-cooling maximizes power plant fuel efficiency by providing a continuous source of effective cooling for the plant's steam condensers. Dry cooling will typically provide less effective cooling of the condensers, reducing the efficiency of the steam cycle portion of the power plant, and thus the overall fuel efficiency of the facility. Since only about one-third of the power from a combined cycle power plant is produced by the steam cycle, however, this negative impact on fuel efficiency is diluted.

The FSA for the Beacon Solar Energy Project (08-AFC-2; BSEP 2009) showed that annual average fuel (solar energy) efficiency would be reduced 5-7 percent compared to a wet cooling system. The Genesis applicant stated that use of dry cooling would result in a 7.4 percent decrease in total annual net MWh compared with a wet cooling system (GSEP 2009a). In order to counter the reduction in generation that would result from dry cooling, the Beacon Solar Energy Project applicant proposed expanding the solar field by 12 percent.

The GSEP applicant states that the proposed project has been optimized for the land available, and therefore solar field expansion is infeasible (GSEP 2009a). However, the power block and solar arrays would occupy approximately 1,360 acres of the 1,800-acre

site. Evaporation ponds, access roads, administration buildings, and other support facilities would require a portion of the 1,800-acre site, and there is also remaining open space (GSEP 2009a). Additionally, use of dry-cooling would require smaller evaporation ponds opening up additional land for solar field expansion. A 12 percent increase in the solar field would require approximately 150 additional acres. While it is uncertain whether the entire 150 acres is available for use, and would also comply with the engineering requirements for GSEP, it is clear from the site plan that there is some available land immediately adjacent to existing solar trough rows (which could also potentially be arranged in a closer configuration) to offset all or a portion of the efficiency loss due to the use of dry-cooling.

C.13.6.3 CEQA Level of Significance

The dry cooling option would significantly reduce the volume of non-hazardous evaporation pond residue estimated to be 50,000 tons every seven years requiring disposal using the wet cooling option. In addition, the non-hazardous solid waste generated during periodic maintenance of the water treatment filters (spent media of sand, gravel, garnet, anthracite, about 2100 cubic feet every 5 years) and disposal or recycling of the reverse osmosis filters (approximately 440 cartridges every few months and about 160 RO membrane elements every 3 to 5 years) would be significantly reduced. Consequently, the overall impacts of the project with dry cooling related to waste management (waste generation and disposal) would be reduced compared to the proposed project.

C.13.7 NO PROJECT/NO ACTION ALTERNATIVES

No Project/No Action Alternative #1:

No Action on Genesis Solar Energy Project application and on CDCA land use plan amendment

Under this alternative, the proposed Genesis Solar Energy 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. As a result, no new wastes would be generated. This No Project/No Action Alternative would not result in impacts to waste management at this location. 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 Genesis Solar Energy Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Genesis Solar Energy 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 will be developed with another solar technology. Different solar technologies would create different amounts and types of wastes based on the technology components and requirements; however, it is expected that the construction of all solar technologies at the site would generate waste. As such, impacts to waste management from the solar project would likely be similar to impacts to waste management from the proposed project. Therefore, this No Project/No Action Alternative could result in waste management impacts similar to the impacts under the proposed project.

No Project/No Action Alternative #3:

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

Under this alternative, the proposed Genesis Solar Energy 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 so no solar projects can be 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 wastes would be generated from the construction or operation of the proposed project under this alternative. Therefore, this No Project/No Action Alternative would not result in impacts to waste management. 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.13.8 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 Figure 1** 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 eastern Riverside County, are shown on **Cumulative Impacts Figure 2,** I-10 Corridor 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 I-10 Corridor 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.

Geographic Scope of Analysis

The geographic area considered for cumulative impacts on waste management is Riverside County where implementation of the GSEP project could combine with those impacts of other local or regional projects. 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.

The geographic extent for the analysis of the cumulative impacts associated with the GSEP project includes Riverside County. This geographic scope is appropriate because Class III waste disposal facilities in Riverside County could easily handle all waste generated by the GSEP project. There are no Class I/Class II landfills in Riverside County, but the two nearest hazardous waste disposal sites (Buttonwillow Landfill and Kettleman Hills Landfill) routinely except hazardous waste from throughout California and both have large capacity and expected life to year 2038-2040.

Effects of Past and Present Projects

For this analysis, the following projects or developments are considered most relevant to effects on waste management. Existing projects currently generating non-hazardous solid waste along the I-10 Corridor include Chuckwalla Valley State Prison, Ironwood State Prison, and Blythe Energy Project. Non-hazardous waste is also generated by the residential and commercial activities in Blythe and Desert Center.

Waste management in the geographic area has been impacted by past and currently approved projects by requiring additional landfill capacity. The Blythe Sanitary Landfill, the closest landfill, is anticipated to have adequate capacity for municipal waste through the year 2134 (GSEP 2009a) accepting about 400 tons per day; there are several other large capacity landfills in the region. The GSEP project wastes would be generated in modest quantities (10 cubic yards or 1 to 2 tons per week), waste recycling would be employed wherever practical, and sufficient capacity is available at several disposal

facilities to handle the volumes of wastes that would be generated by the project. The project's incremental effective of solid waste disposal is not cumulatively considerable and would have no cumulative impact on existing projects.

Effects of Reasonably Foreseeable Future Projects

Waste management is also expected to be affected by the following reasonably foreseeable future projects as follows: (1) future projects along the I-10 corridor, and (2) future renewable energy projects in the California desert.

Foreseeable Projects in the Project Area

The GSEP project waste disposal volumes will combine with the waste volumes from four commercial projects, 15 residential projects, and 16 renewable projects along the I-10 Corridor (Cumulative Impacts Table 3). Although the waste volumes would be greatest during construction the actual construction schedule of each project would not likely be coincident such that local landfill daily disposal limitations would be exceeded. Operation waste volumes of transmission line, substation, and solar photovoltaic projects (not solar-thermal) would be far less than the three solar-thermal energy projects (Palen, Blythe, Mojave Solar Park/Desert Lily Project) and the Blythe Energy Project II Power Plant.

Routine (operation) waste disposal of all foreseeable commercial, residential, and energy projects along the I-10 Corridor may combine to occasionally exceed the 400 ton per day limit at the Blythe Sanitary Landfill without adversely impacting the 2.2 million cubic yards of remaining capacity. The Blythe Landfill is the nearest Class III disposal site for these I-10 Corridor Projects and would likely be the first choice for disposal. However, several other landfills are located within 100 miles of GSEP with much larger daily disposal limits. The total amount of available solid waste landfill capacity in Riverside County exceeds 160 million cubic yards. Therefore, even if all 35 of these reasonably foreseeable projects along the I-10 Corridor were constructed, staff concludes that the waste generated by the GSEP project would not result in significant cumulative waste management impacts.

Foreseeable Renewable Projects in the California Desert

As shown on **Figure 1** and **Table 1A** (Cumulative Impacts) solar and wind applications for use of BLM and private land cover approximately 1 million acres of the California Desert Conservation Area. Most of the projects are located outside of the Geographic Extent identified for the waste management cumulative impact analysis. The remaining projects are within the BLM Palm Springs/South Coast Field Office area, and include all of the local I-10 Corridor projects discussed above. Four wind energy projects within the BLM's Palm Springs/South Coast Field Office region are not anticipated to generate significant volumes of solid waste.

Implementation of the multiple solar and wind projects proposed to be developed in California desert area would result in an increase in generation of hazardous and non-hazardous solid and liquid waste and would add to the total quantity of waste generated in California and Nevada. However, project wastes would be generated in modest quantities, waste recycling would be employed wherever practical, and sufficient

capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. Therefore, the incremental effect of GSEP project waste disposal impacts, when combined with the effects of waste management impacts created by other reasonably foreseeable regional impacts would be less than significant because the project related waste volumes would not exceed the regional Class I, II, and III waste disposal capacities.

Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction. The construction of the Genesis Solar Energy Project (GSEP) is not expected to result in short term adverse impacts related to construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the GSEP. As a result, there may be substantial short term impacts during construction of those cumulative projects related to waste management.

The GSEP would be expected to contribute only a small amount to the possible short term cumulative impacts related to waste management because the anticipated maximum volume of 40 cubic yards per week (4-10 tons) is readily accommodated by the local and regional landfills.

Operation. The operation of the GSEP is not expected to result in long term adverse impacts during operation of the project related to waste management. It is expected that some of the cumulative projects described above may be operational at the same time as the GSEP. As a result, there may be substantial long term impacts during operation of those cumulative projects related to waste management. The GSEP would be expected to contribute only a small amount to these possible long term operational cumulative impacts related to waste management because of the small volume of waste requiring landfill disposal.

Decommissioning. The decommissioning of the GSEP is not expected to result in adverse impacts related to waste management 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 waste management during decommissioning of the GSEP generated by the cumulative projects. As a result, the impacts of the decommissioning of the GSEP would not be expected to contribute to cumulative impacts related to waste management because most components (metal, concrete, asphalt, wood) would be recycled and the volume requiring Class I or Class III landfill disposal would be disposed of over several months.

C.13.9 COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed GSEP project would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be

produced during both project construction and operation, the GSEP project would be required to obtain a hazardous waste generator identification number from U.S. EPA. The GSEP project would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

C.13.10 NOTEWORTHY PUBLIC BENEFITS

- Staff has not identified any public benefits associated with waste management.

C.13.11 RESPONSE TO COMMENTS

Applicant (TetraTech April 30, 2010): NextEra will abide by the Waste Management LORS and a separate agreement with DTSC is not necessary.	Staff concurs and removed the requirement for a separate consent agreement from **WASTE-1**.
Applicant (TetraTech April 30, 2010): Professional Geologist or Engineer will oversee building demolition and soil excavation.	Staff modified **WASTE-2** to include the text for clarity.
Applicant (TetraTech April 30, 2010): Professional Geologist or Engineer oversight does not relate to any additional site characterization, if necessary..	Staff did not modify **WASTE-2**. In the event additional site assessment or characterization of contamination is required, this work shall have oversight from a registered professional.
Applicant (TetraTech April 30, 2010): Some language is vague and enforcement action against contractor divisions working in other parts of the country may not be related to the proposed project.	Staff modified **WASTE-7** to clarify that enforcement actions related to waste management occur on the project site; the CPM will evaluate the result of the finalized action before notifying the project owner of any required changes to waste-management practices; the project owner shall notify the CPM after receiving written notice from authorities.

C.13.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

WASTE-1 In the event that contamination is identified during assessment of the project site, during any phase of GSEP construction, any additional work to assess and/or remediate any contamination shall be conducted under the oversight of DTSC, with CPM involvement.

Verification: The project owner shall consult with the Department of Toxic Substances Control, and abide by all federal, state and local requirements for site assessment and remediation if contaminated soil is identified during any phase of GSEP site construction. The project owner shall ensure that the CPM is involved and appraised of all discussions with Department of Toxic Substances Control, and CPM concurrence shall be required for project decisions addressing site remediation.

WASTE-2 The project owner shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available for additional site characterization (if needed), building demolition, soil excavation, and grading activities, to the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil and impact public health, safety and the environment.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to the CPM for review and approval.

WASTE-3 If potentially contaminated soil is identified during site characterization, demolition, excavation or grading at either the proposed site or linear facilities, as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the professional engineer or professional geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of Department of Toxic Substances Control or Regional Water Quality Control Board, and the CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the professional engineer or professional geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If in the opinion of the professional engineer or professional geologist, significant remediation may be required, the project owner shall contact the CPM and representatives of the Department of Toxic Substances Control or Regional Water Quality Control Board for guidance and possible oversight.

Verification: The project owner shall submit any reports filed by the professional engineer or professional geologist to the CPM within 5 days of their receipt. The project owner shall notify the CPM within 24 hours of any orders issued to halt construction.

WASTE-4 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to the CPM for review and approval prior to the start of construction. The plan shall contain, at a minimum, the following:

- A description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications; and
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct

classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.

Verification: The project owner shall submit the Construction Waste Management Plan to the CPM for approval no less than 30 days prior to the initiation of construction activities at the site.

WASTE-5 The project owner shall prepare a UXO Identification, Training and Reporting Plan to properly train all site workers in the recognition, avoidance and reporting of military waste debris and ordnance. The project owner shall submit the plan to the CPM for review and approval prior to the start of construction. The plan shall contain, at a minimum, the following:

- A description of the training program outline and materials, and the qualifications of the trainers; and
- Identification of available trained experts that will respond to notification of discovery of any ordnance (unexploded or not); and
- Work plan to recover and remove discovered ordnance, and complete additional field screening, possibly including geophysical surveys to investigate adjacent areas for surface, near surface or buried ordnance in all proposed land disturbance areas.

Verification: The project owner shall submit the UXO Identification, Training and Reporting Plan to the CPM for approval no less than 30 days prior to the initiation of construction activities at the site.

WASTE-6 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency (USEPA) prior to generating any hazardous waste during project construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide documentation of the hazardous waste generation and notification and receipt of the number to the CPM in the next scheduled Monthly Compliance Report after receipt of the number. Submittal of the notification and issued number documentation to the CPM is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to USEPA. Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to the CPM in the next scheduled compliance report.

WASTE-7 Upon notification of any impending waste management-related enforcement action related to project site activities by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts for the project, and describe the owner's response to the impending action or if a violation has been found, how the violation will be corrected.

Verification: The project owner shall notify the CPM in writing within 10 days of receiving written notice from authorities of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed as a result of a finalized action against the project.

WASTE-8 The project owner shall provide a reuse/recycling plan for at least 50 percent of construction and demolition materials prior to any building or demolition. The project owner shall ensure compliance and shall provide proof of compliance documentation to the CPM, including a recycling and reuse summary report, receipts, and records of measurement. Project mobilization and construction shall not proceed until the CPM issues an approval document.

Verification: At least 60 days prior to the start of any construction or demolition activities, the project owner shall submit a reuse recycling plan to the CPM for review and approval. The project owner shall ensure that project activities are consistent with the approved reuse/recycling plan and provide adequate documentation of the types and volumes of wastes generated, how the wastes were managed, and volumes of wastes diverted. Project mobilization and construction shall not proceed until CPM issues an approval document. Not later than 60 days after completion of project construction, the project owner shall submit documentation of compliance with the diversion program requirements to the CPM. The required documentation shall include a recycling and reuse summary report along with all necessary receipts and records of measurement from entities receiving project wastes.

WASTE-9 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the Genesis Solar Energy facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- A detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- Management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- Information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- A detailed description of how facility wastes will be managed, and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and

- A detailed description of how facility wastes will be managed and disposed of upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to the CPM for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to the CPM within 20 days of notification from the CPM that revisions are necessary.

The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.

WASTE-10 The project owner shall submit to the CPM and DTSC for approval an assessment of whether the HTF contaminated soil is considered hazardous or non-hazardous under state regulations. HTF-contaminated soil that exceeds the hazardous waste levels must be disposed of in accordance with California Health and Safety Code (HSC) Section 25203. HTF-contaminated soil that does not exceed the hazardous waste levels may be discharged into the land treatment unit (LTU). For discharges into the LTU, the project owner shall comply with the Waste Discharge Requirements contained in the Soil & Water Resources section of this document.

The project owner shall document all releases and spills of HTF as described in Condition of Certification WASTE-11 and report only those that are 42 gallons or more, the CERCLA reportable quantity. Cleanup and temporary staging of HTF-contaminated soils shall be conducted in accordance with the approved Operation Waste Management Plan required in Condition of Certification of WASTE-9. The project owner shall sample HTF-contaminated soil from CERCLA reportable incidents involving 42 gallons or more in accordance with the United States Environmental Protection Agency's (USEPA) current version of "Test Methods for Evaluating Solid Waste" (SW-846). Samples shall be analyzed in accordance with USEPA Method 8015 or other method to be reviewed and approved by DTSC and the CPM.

If DTSC and the CPM determine the HTF-contaminated soil is considered hazardous it shall be disposed of in accordance with California Health and Safety Code (HSC) Section 25203 and procedures outlined in the approved Operation Waste Management Plan required in Condition of Certification **WASTE-9** and reported to the CPM in accordance with Condition of Certification **WASTE-11**.

If DTSC and the CPM determine the HTF-contaminated soil is considered non-hazardous it shall be retained in the LTU and treated on-site in accordance with the Waste Discharge Requirements contained within in the Soil & Water Resources section of this document.

Verification: Within 28 days of an HTF spill the project owner shall provide the results of the analyses and their assessment of whether the HTF-contaminated soil is considered hazardous or non-hazardous to DTSC and the CPM for review and approval.

WASTE-11 The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are documented and cleaned up and that wastes generated from the release/spill are properly managed and disposed of, in accordance with all applicable federal, state, and local requirements. The project owner shall document management of all accidental spills and unauthorized releases of hazardous substances, hazardous materials, and hazardous wastes that are in excess of EPA's reportable quantities (RQ), that occur on the project property or related linear facilities during construction and on the property during operation. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; how release was managed and material cleaned up; amount of contaminated soil and/or cleanup wastes generated; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements placed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release.

Verification: A copy of the unauthorized release/spill documentation shall be provided to the CPM within 30 days of the date the release was discovered.

C.13.13 CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the Introduction section of this analysis), staff provides the following conclusions:

After review of the applicant's proposed waste management procedures, staff concludes that project wastes would be managed in compliance with all applicable waste management LORS. Staff notes that construction, demolition, and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and nonrecyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time, and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **10**. These conditions would require the project owner to do all of the following:

- Ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE 1**, **2**, and **3**).
- Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes will be managed, recycled, and/or disposed of after generation (**WASTE-4** and **-9**).
- Prepare and implement a UXO Identification, Training and Reporting Plan and work plan outlining procedures to recover and dispose of ordnance, as well as complete additional field surveys **(WASTE-5)**.
- Obtain a hazardous waste generator identification number (**WASTE-6**).
- Report any waste management-related LORS enforcement actions related to project site activities and how violations will be corrected (**WASTE-7**).
- Comply with waste recycling and diversion requirements (**WASTE-8**).
- Comply with stipulations for treatment of HTF-contaminated soils (**WASTE-10**)
- Ensure that all spills or releases of hazardous substances that are in excess of EPA's reportable quantities (RQ's) are reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-11**).

The existing available capacity for the Class III landfills that may be used to manage nonhazardous project wastes exceeds 160 million cubic yards. The total amount of non-hazardous wastes generated from construction, demolition and operation of the GSEP project would contribute much less than 1 percent of the projected landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

In addition, the two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of GSEP have a combined remaining capacity of 15 million cubic yards, with another 4.6 to 4.9 million cubic yards of proposed capacity. The total amount of hazardous wastes generated by the GSEP project would be less than significant in relation to the remaining permitted capacity. Therefore, impacts from disposal of GSEP generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

Staff concludes that management of the waste generated during construction and operation of the GSEP project would not result in any significant adverse impacts, and would comply with applicable LORS, if the waste management practices and mitigation measures proposed in the GSEP project AFC and staff's proposed conditions of certification are implemented.

C.13.14 REFERENCES

CCR 2008 – California Environmental Quality Act (CEQA) Guidelines. Title 14, California Code of Regulations, section 15000 and the following (Cal. Code Regs., tit. 14, §15000 et seq,).

CEC 2009t - California Energy Commission/E. Solorio (tn: 51934). CEC Staff Dialogue with DTSC Regarding HTF for the Beacon Solar Energy Project, dated 6/9/09. Submitted to CEC/Docket Unit on 6/11/09.

California State Water Resources Control Board (SWRCB) 2010. Geotracker website. http://geotracker.waterboards.ca.gov/

California Integrated Waste Management Board (CIWMB) 2009. Jurisdictions with Construction & Demolition (C&D) Ordinances. http://www.ciwmb.ca.gov/LGCentral/Summaries/33/

EEC 2006a – Eastshore Energy Center, LLC/ G. Trewitt (tn: 37923) Application for Certification for the Eastshore Energy Center. 09/15/2006 Rec'd 09/22/2006

GSEP 2009a (Gensis Solar Energy Project/T. Bernhardt (tn:) Application for Certification for the Genesis Solar Energy Project, Volumes 1 and 2. Submitted to the California Energy Commission, August 31, 2009.

GSEP 2009f – Applicant's Data Response Set 1A (#1-227) for the Genesis Solar Energy Project. December 14, 2009.

Waste Management 2009 – Kettleman Hills Facility Project Update. http://www.kettlemanhillsfacts.com/project_update.html

C.14 – WORKER SAFETY AND FIRE PROTECTION

Testimony of Alvin Greenberg, Ph.D.

C.14.1 SUMMARY OF CONCLUSIONS

U.S. Bureau of Land Management and Energy Commission staff (hereafter jointly referred to as staff) concludes that if the applicant for the proposed Genesis Solar Energy Project (GSEP) provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program, as required by Conditions of Certification **WORKER SAFETY-1**and **-2** and fulfils the requirements of Conditions of Certification **WORKER SAFETY-3** through **-9**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards. The proposed conditions of certification provide assurance that the Construction Safety and Health Program and the Operations and Maintenance Safety and Health Program proposed by the applicant would be reviewed by the appropriate agencies before implementation. The conditions also require verification that the proposed plans adequately assure worker safety and fire protection and comply with applicable laws, ordinances, regulations, and standards. In addition, adherence to staff's proposed conditions would reduce the risk of workers or the public contracting Valley Fever to a less than significant level.

Staff has considered the position of the Riverside County Fire Department (RCFD) and all relevant information as well as past experience at other solar power plants in California and has determined that the project would cause a significant individual direct and cumulative impact on local fire protection services. Therefore, staff is proposing mitigation to reduce these impacts to less than significant by requiring payment to the RCFD for capital and personal support (see proposed Conditions of Certification **WORKER SAFETY-7).**

C.14.2 INTRODUCTION

Worker safety and fire protection is regulated through laws, ordinances, regulations, and standards (LORS), at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment, and procedural controls.

The purpose of this Revised Staff Assessment (RSA) is to assess the worker safety and fire protection measures proposed by the GSEP and to determine whether the applicant has proposed adequate measures to:

- comply with applicable safety LORS;
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

C.14.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Two issues are assessed in **Worker Safety-Fire Protection**:

1. the potential for impacts on the safety of workers during demolition, construction, and operations activities, and

2. fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, and operations.

Worker safety issues are thoroughly addressed by Cal/OSHA regulations. If all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on workers is whether or not the applicant has demonstrated adequate knowledge about and dedication to implementing all pertinent and relevant Cal/OSHA standards.

Regarding fire prevention matters, staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant and the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the proposed power plant site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews and evaluates the local fire department capabilities and response time in each area and interviews the local fire officials to determine if they feel adequately trained, manned, and equipped to respond to the needs of a power plant. Staff then determines if the presence of the power plant would cause a significant impact on a local fire department. If it does, staff will recommend that the applicant mitigate this impact by providing increased resources to the fire department.

Staff has also established a procedure when a local fire department has identified either a significant incremental project impact to the local agency or a significant incremental cumulative impact to a local agency. Staff first conducts an initial review of the position and either agrees or disagrees with the fire department's determination that a significant impact would exist if the proposed power plant is built and operated. A process then starts whereby the project applicant can either accept the determination made by staff or refute the determination by providing a Fire Needs Assessment and a Risk Assessment. The Fire Needs Assessment would address fire response and equipment/staffing/location needs while the Risk Assessment would be used to establish that while an impact to the fire department <u>may</u> indeed exist, the risk (chances) of that impact occurring and causing injury or death is less than significant.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Title 29 U.S. Code (USC) section 651 et seq (Occupational Safety and Health Act of 1970)	This act mandates safety requirements in the workplace with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
Title 29 Code of Federal Regulation (CFR) sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
29 CFR sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own Safety and Health requirements, in lieu of most of the federal requirements found in 29 CFR sections 1910.1 to 1910.1500.
State	
Title 8 California Code of Regulations (Cal Code Regs.) all applicable sections (Cal/OSHA regulations)	These sections require that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during construction, commissioning, and operations of power plants, as well as safety around electrical components, fire safety, and hazardous materials use, storage, and handling.
24 Cal Code Regs. section 3, et seq.	This section incorporates the current addition of the Uniform Building Code.
Health and Safety Code section 25500, et seq.	This section presents Risk Management Plan requirements for threshold quantity of listed acutely hazardous materials at a facility.
Health and Safety Code sections 25500 to 25541	These sections require a Hazardous Material Business Plan detailing emergency response plans for hazardous materials emergency at a facility.
Local (or locally enforced)	
Riverside County Ordinance 457	Adopts specific building, mechanical, plumbing, and electrical codes from sources such as the California Building Standards Commission with county-specific modifications.
Riverside County Ordinance 787	Adopts the 2007 edition of the California Fire Code and portions of the 2007 edition of the California Building Code with county-specific modifications.
Riverside County	Establishes requirements for the use, generation, storage and

Ordinance 615	disposal of hazardous materials within the County.
Riverside County Dept. of Environmental Health, Hazardous Materials Releases	Adopts State requirements and guidelines to govern hazardous materials release response plans and inventories.

C.14.4 PROPOSED PROJECT

C.14.4.1 SETTING AND EXISTING CONDITIONS

The proposed facility would be located in Riverside County approximately 25 miles west of the City of Blythe and 27 miles east of Desert Center, and would consist of two units producing a total output of 250 MW. Fire support services to the site would be under the jurisdiction of the Riverside County Fire Department (RCFD). The closest RCFD fire station would be Blythe Air Base Station #45, located about 15 miles east of the GSEP. The estimated response time from the moment of dispatch is about 23 minutes. The next closest station would be Lake Tamarisk Station #49, located about 35 miles west of the GSEP with a response time of about 35 minutes. RCFD fire stations are staffed full-time with a minimum of three personnel per shift which include paramedics (RCFD 2010).

The applicant has stated that certain plant personnel would be trained as a hazardous materials response team and that one or more spill response kits would be available on-site (GSEP 2009a, Section 5.12.3.2). In the event of a large incident involving hazardous materials, backup support would be provided by the RCFD which has a hazmat response unit capable of handling any incident at the proposed GSEP. The nearest hazmat response team is located in Palm Desert, about 90 miles west of the project site, and would respond within 1.5-2 hours (GSEP 2009a, Section 5.8.1.6 and RCFD 2010).

Worker Safety and Fire Protection Table 2
Fire and Emergency Response for the GSEP*

RCFD Station	Response Time**	Distance to GSEP	EMS/HazMat Capability***
Blythe Air Base Station #45	~28 minutes	~15 miles	Y/Y
Lake Tamarisk Station #49	~40 minutes	~35 miles	Y/Y

*Source: E-mail communications with the RCFD (RCFD 2010a)
**Response times are estimated from the moment of dispatch.
***All personnel are trained to Emergency Medical Technician (EMT-1) level and first responder for hazardous materials incidents.

In addition to construction and operations worker safety issues, the potential exists for exposure to contaminated soil during site preparation. The Phase I Environmental Site Assessment conducted for this site in 2009 found 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 (GSEP 2009a, Section 5.13.1.3). To address the unlikely possibility that soil contamination would be encountered during construction of the GSEP, proposed Conditions of Certification **Waste-1** and **Waste-2** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. See the staff assessment section on **WASTE MANAGEMENT** for a more detailed analysis of this topic.

Another potential hazard present at this site is the likelihood of encountering unexploded ordnance (UXOs) left over from large scale military training exercises conducted near the California-Arizona border between 1942 and 1945 and in 1964. The applicant stated that a geophysical survey to identify UXO may be conducted (GSEP 2009a, Section 5.13.1.3). In response the Data Requests 226 and 227, the applicant stated that during the biological and cultural resource surveys conducted over several weeks at the GSEP site, a large number of staff combed the surface of the entire GSEP site and found only one 50 caliber cartridge. Therefore the applicant does not believe additional investigations or a UXO Neutralization/Removal Plan are necessary. The applicant noted that a training program for identifying UXO would be implemented during construction which would be sufficient to ensure proper handling of UXO in the unlikely event of encountering any (GSEP 2009f, Data Response Items 226 and 227).

C.14.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Worker Safety

Industrial environments are potentially dangerous during construction and operation of facilities. Workers at the proposed GSEP would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, and numerous other injuries. They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks and electrocution. It is important for the GSEP to have well-defined policies and procedures, training, and hazard recognition and control at its facility to minimize such hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

A Safety and Health Program would be prepared by the applicant to minimize worker hazards during construction and operation. Staff uses the phrase "Safety and Health Program" to refer to the measures that would be taken to ensure compliance with the applicable LORS during the construction and operational phases of the project.

Construction Safety and Health Program

Workers at the GSEP would be exposed to hazards typical of construction and operation of a solar thermal electric power generating facility.

Construction Safety Orders are published at Title 8 California Code of Regulations sections 1502, et seq. These requirements are promulgated by Cal/OSHA and would be applicable to the construction phase of the project. The Construction Safety and Health Program would include the following:

- Construction Injury and Illness Prevention Program (8 Cal Code Regs. § 1509)
- Construction Fire Prevention Plan (8 Cal Code Regs. § 1920)
- Personal Protective Equipment Program (8 Cal Code Regs. §§ 1514 — 1522)
- Emergency Action Program and Plan

Additional programs under General Industry Safety Orders (8 Cal Code Regs. §§ 3200 to 6184), Electrical Safety Orders (8 Cal Code Regs. §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 Cal Code Regs. §§ 450 to 544) would include:

- Electrical Safety Program
- Motor Vehicle and Heavy Equipment Safety Program
- Forklift Operation Program
- Excavation/Trenching Program
- Fall Protection Program
- Scaffolding/Ladder Safety Program
- Articulating Boom Platforms Program
- Crane and Material Handling Program
- Housekeeping and Material Handling and Storage Program
- Respiratory Protection Program
- Employee Exposure Monitoring Program
- Hand and Portable Power Tool Safety Program
- Hearing Conservation Program
- Back Injury Prevention Program
- Hazard Communication Program
- Heat and Cold Stress Monitoring and Control Program
- Pressure Vessel and Pipeline Safety Program

The Application for Certification (AFC) includes adequate outlines of each of the above programs (GSEP 2009a, Section 5.14.1.2). Prior to the start of construction of GSEP, detailed programs and plans would be provided to the California Energy Commission Compliance Project Manager (CPM) and to the RCFD pursuant to the Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start of operations at GSEP, the Operations and Maintenance Safety and Health Program would be prepared. This operational safety program would include the following programs and plans:

- Injury and Illness Prevention Program (8 Cal Code Regs. § 3203)
- Fire Protection and Prevention Program (8 Cal Code Regs. § 3221)
- Personal Protective Equipment Program (8 Cal Code Regs. §§ 3401 to 3411)
- Emergency Action Plan (8 Cal Code Regs. § 3220)

In addition, the requirements under General Industry Safety Orders (8 Cal Code Regs. §§ 3200 to 6184), Electrical Safety Orders (8 Cal Code Regs. §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 Cal Code Regs. §§ 450 to 544) would be applicable to the project. Written safety programs for GSEP, which the applicant would develop, would ensure compliance with the above-mentioned requirements.

The AFC includes adequate outlines of the Injury and Illness Prevention Program, Emergency Action Plan, Fire Prevention Program, and Personal Protective Equipment Program (GSEP 2009a, Sections 5.14.1.2 and 5.14.1.3). Prior to operation of GSEP, all detailed programs and plans would be provided to the CPM and RCFD pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

As mentioned above, the applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. Both safety and health programs would be comprised of six more specific programs and would require major items detailed in the following paragraphs.

Injury and Illness Prevention Program

The IIPP would include the following components as presented in the AFC (GSEP 2009a, Section 5.14.1.2):

- identity of person(s) with authority and responsibility for implementing the program;
- safety and health policy of the plan;
- definition of work rules and safe work practices for construction activities;
- system for ensuring that employees comply with safe and healthy work practices;
- system for facilitating employer-employee communications;
- procedures for identifying and evaluating workplace hazards and developing necessary program(s);
- methods for correcting unhealthy/unsafe conditions in a timely manner;
- safety procedures; and
- training and instruction.

Fire Prevention Plan

California Code of Regulations requires an Operations Fire Prevention Plan (8 Cal Code Regs. § 3221). The AFC outlines a proposed Fire Prevention Plan which is acceptable to staff (GSEP 2009a, Section 5.14.1.3). The plan would accomplish the following:

- determine general program requirements (scope, purpose, and applicability);
- determine potential fire hazards;
- develop good housekeeping practices and proper handling and materials storage;
- determine potential ignition sources and control measures for these sources;
- determine persons responsible for equipment and system maintenance;
- locate portable and fixed fire-fighting equipment in suitable areas;
- establish and determine training and instruction requirements; and
- define recordkeeping requirements.

Staff proposes that the applicant submit a final Fire Prevention Plan to the CPM for review and approval and to the RCFD for review and comment to satisfy proposed Conditions of Certification **WORKER SAFETY-1** and **WORKER SAFETY-2**. In addition, staff has determined that joint training exercises with the RCFD in fire suppression, rescue, hazmat spill response, and EMS response is critical to being prepared to address an emergency. Therefore, staff proposes Condition of Certification **WORKER SAFETY-9** which would require the project owner to participate in joint training exercises with the Riverside County Fire Department (RCFD). The project owner would coordinate this training with other Energy Commission-licensed solar power plants within Riverside County such that the Genesis project would only be required to host the annual training on a rotating basis with the other solar power plants.

Personal Protective Equipment Program

California regulations require Personal Protective Equipment (PPE) and first aid supplies whenever hazards are present that, due to process, environment, chemicals or mechanical irritants, can cause injury or impair bodily function as a result of absorption, inhalation, or physical contact (8 Cal Code Regs. §§ 3380 to 3400). The GSEP operational environment would require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and would carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information pertaining to the protective clothing and equipment:

- proper use, maintenance, and storage;
- when to use the protective clothing and equipment;
- benefits and limitations; and
- when and how to replace the protective clothing and equipment.

The PPE Program ensures that employers comply with the applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential workplace hazards.

Emergency Action Plan

California regulations require an Emergency Action Plan (8 Cal Code Regs. § 3220). The AFC contains a satisfactory outline for an emergency action plan (GSEP 2009a, Section 5.14.1.3).

The outline lists plans to accomplish the following:

- establish scope, ,purpose, and applicability;
- identify roles and responsibilities;
- determine emergency incident response training;
- develop emergency response protocols;
- specify evacuation protocols;
- define post emergency response protocols; and
- determine notification and incident reporting.

Written Safety Program

In addition to the specific plans listed above, additional LORS called *safe work practices* apply to the project. Both the Construction and the Operations Safety Programs would address safe work practices under a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading "Construction Safety and Health Program" in this **Worker Safety and Fire Protection** section.

Safety Training Programs

Employees would be trained in the safe work practices described in the above-referenced safety programs.

Additional Safety Issues

This solar power plant will present a unique work environment that includes a solar field located in the high desert. The solar field features thousands of mirrors that heat a heat transfer fluid (HTF) to approximately 750°F. The pipe containing the HTF will reach temperatures at the mirror focal point as high as 1100 °F. Experience at existing solar generating stations shows that these mirrors break, the pipes age, and HTF can leak and catch fire from ball joints or frayed flex hoses. The area under the solar arrays must be kept free from weeds and thus herbicides will be applied as necessary. Exposure to workers via inhalation and ingestion of dusts containing herbicides poses a health risk. Finally, workers will inspect the solar array for HTF leaks and broken mirrors at least once each day by driving up and down dirt paths between the rows of mirrors and even under the mirrors. Cleaning the mirrors will also be conducted on a routine schedule. All these activities will take place year-round and especially during the summer months of

peak solar power generation, when outside ambient temperatures routinely reach 115 °F and above.

The applicant has indicated that workers will be adequately trained and protected, but has not included precautions against heat stress and exposure to herbicides. Therefore, to ensure that workers are indeed protected, staff has proposed additional requirements to proposed Conditions of Certification **WORKER SAFETY-1** and **2**. These requirements consist of the following provisions:

- A worker heat stress protection plan that implements and expands on existing Cal OSHA regulations (8 CCR 3395) requiring heat illness prevention; and
- The development and implementation of Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar array.

Staff believes that effective implementation of a Heat Stress Protection Plan will mitigate the potential for significant risks to workers from heat during both construction and operations. A BMP requiring proper herbicide storage and application will mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides will contaminate either surface water or groundwater. Staff suggests that a BMP follow either the guidelines established by the U.S. Environmental Protection Agency (EPA) (EPA 1993), or more recent guidelines established by the State of California or U.S. EPA.

Additional Mitigation Measures

Protecting construction workers from injury and disease is among the greatest challenges in occupational safety and health. The following facts are reported by the National Institute for Occupational Safety and Health (NIOSH):

- More than 7 million persons work in the construction industry, representing 6 percent of the labor force. Approximately 1.5 million of these workers are self-employed.
- Of approximately 600,000 construction companies, 90 percent employ fewer than 20 workers. Few have formal safety and health programs.
- From 1980 to 1993, an average of 1,079 construction workers were killed on the job each year—more fatal injuries than in any other industry.
- Falls caused 3,859 construction worker fatalities (25.6 percent) between 1980 and 1993.
- Construction injuries account for 15 percent of workers' compensation costs.
- Assuring safety and health in construction is complex, involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity.
- In 1990, Congress directed NIOSH to undertake research and training to reduce diseases and injuries among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are thus well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex, industrial-type projects such as the construction of solar power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a Construction Safety Supervisor to ensure a safe and healthful environment for all personnel. That this standard practice has reduced and/or eliminated hazards has been evident in the audits staff recently conducted of power plants under construction. The federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as Construction Safety Supervisors, Construction Health and Safety Officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors in four areas:

- to improve their safety and health performance;
- to assist them in striving for the elimination of the four hazards (falls, electrical, caught in/between and struck-by hazards), which account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections;
- to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and
- to recognize those subcontractors with exemplary safety and health programs.

To date, there are no OSHA or Cal/OSHA requirements that an employer hire or provide for a Construction Safety Officer. OSHA and Cal/OSHA regulations do, however, require that safety be provided by an employer and the term *Competent Person* is used in many OSHA and Cal/OSHA standards, documents, and directives. A Competent Person is usually defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a power plant site Construction Safety Supervisor.

As discussed above, the hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex, industrial-type projects such as the construction of solar power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past due to the failure to recognize and control safety hazards and the inability to adequately supervise compliance with occupational safety and health regulations. Safety problems have been documented by Energy Commission staff in safety audits conducted in 2005 at several power plants under construction. The findings of the audit staff include, but are not limited to, such safety oversights as:

- lack of posted confined space warning placards/signs;

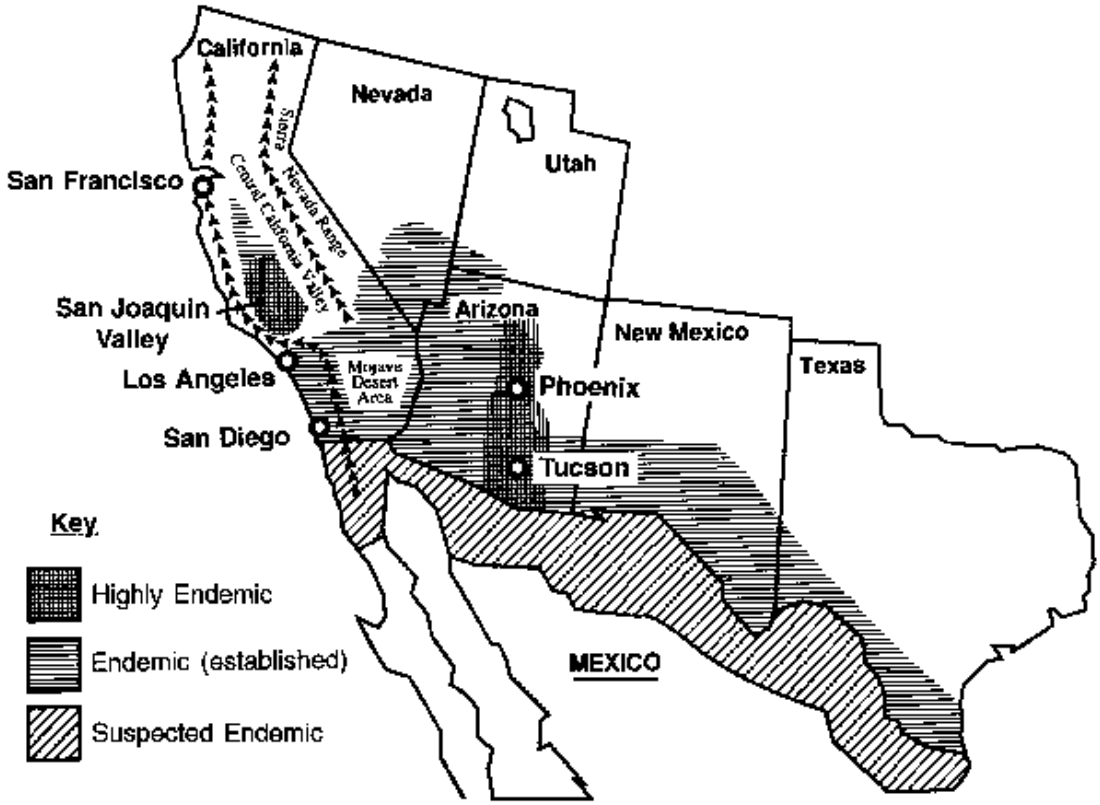
- confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to commissioning team and then to operations;
- dangerous placement of hydraulic elevated platforms under each other;
- inappropriate placement of fire extinguishers near hotwork;
- dangerous placement of numerous power cords in standing water on the site, thus increasing the risk of electrocution;
- construction of an unsafe aqueous ammonia unloading pad;
- inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility but too close to the perimeter fence; and
- lack of adequate employee- or contractor-written training programs addressing proper procedures to follow in the event of finding suspicious packages or objects either on or off site.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to have a professional Safety Monitor on site to track compliance with Cal/OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to operational status. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner, yet reporting to the Chief Building Official (CBO) and Compliance Project Manager (CPM), will serve as an “extra set of eyes” to ensure that safety procedures and practices are fully implemented at all power plants certified by the Energy Commission. During the audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged it in questions about the team’s findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provided a fresh perspective of the site.

Valley Fever (Coccidioidomycosis)

Coccidioidomycosis or "Valley Fever" (VF) is primarily encountered in southwestern states, particularly in Arizona and California. It is caused by inhaling the spores of the fungus Coccidioides immitis, which are released from the soil during soil disturbance (e.g., during construction activities) or wind erosion. The disease usually affects the lungs and can have potentially severe consequences, especially in at-risk individuals such as the elderly, pregnant women, and people with compromised immune systems. Trenching, excavation, and construction workers are often the most exposed population. Treatment usually includes rest and antifungal medications. No effective vaccine currently exists for Valley Fever. VF is endemic to the San Joaquin Valley in California, which presumably gave this disease its common name. In California, the highest VF rates are recorded in Kern, Kings, and Tulare Counties, followed by Fresno and San Luis Obispo Counties. LA County, San Diego County, San Bernardino County, and Riverside County also have reported VF cases although much fewer.

Worker Safety and Fire Protection Figure 1. The geographic distribution of coccidioidomycosis*



*Source: CDC 2006, Figure 2

A 2004 CDC report found that the number of reported cases of coccidioidomycosis in the US increased by 32% during 2003-2004, with the majority of these cases occurring in California and Arizona. The report attributed these increases to changes in land use, demographics, and climate in endemic areas, although certain cases might be attributable to increased physician awareness and testing (CDC 2006). According to the CDC Morbidity and Mortality Weekly Report of February 2009, incidences of valley fever have increased steadily in Arizona and California in the past decade. Cases of coccidioidomycosis averaged about 2.5 per 100,000 population annually from 1995 to 2000 and increased to 8.0 per 100,000 population between 2000 and 2006 (incident rates tripled). In 2007 there was a slight drop in cases, but the rate was still the highest it has been since 1995. The report identified Kern County as having the highest incidence rates (150.0 cases per 100,000 population), and non-Hispanic blacks having the highest hospitalization rates (7.5 per 100,000 population). In addition, between the years 2000 and 2006, the number of valley fever related hospitalizations climbed from 1.8 to 4.3 per 100,000 population (611 cases in 2000 to 1,587 cases in 2006) and then decreased to 1,368 cases in 2007 (3.6 per 100,000 population). Overall in California, during 2000-2007, a total of 752 (8.7 percent) of the 8,657 persons hospitalized for coccidioidomycosis died (CDC 2009).

A 2007 study published in the Emerging Infectious Diseases journal of the Center for Disease Control and Prevention (CDC), found the frequency of hospitalization for coccidioidomycosis in the entire state of California to be 3.7 per 100,000 residents per year for the period between 1997 and 2002 (see Table 1 below). There were 417 deaths from VF in California in those years, resulting in a mortality rate of 2.1 per 1 million California residents annually.

Worker Safety and Fire Protection Table 3: Hospitalizations for coccidioidomycosis, California, 1997–2002*

Category	Total hospitalizations	Total person-yrs (× 10^6)	Frequency of hospitalization**	Frequency of hospitalization for coccidioidal meningitis**
Total	7,457	203.0	3.67	0.657
Year				
1997	1,269	32.5	3.90	0.706
1998	1,144	32.9	3.50	0.706
1999	1,167	33.4	3.5	0.61
2000	1,100	34.0	3.23	0.62
2001	1,291	34.7	3.7	0.58
2002	1,486	35.3	4.2	0.71
Highest incidence counties				
Kern	1,700	3.97	42.8	
Tulare	479	2.21	21.7	
Kings	133	0.77	17.4	
SLO	170	1.48	11.5	

*Source: Flaherman 2007 **Per 100,000 residents per year

Riverside County has approximately 50 cases of VF per year (population is roughly 2 million) while nearby San Diego County has about 120 cases per year (population roughly 3 million). In comparison, an average of over 1,000 cases have been reported annually in Kern County during the last five years. Cases of VF in Riverside County have remained steady in the past several years, fluctuating only slightly between 48 and

55 cases per year. Nine deaths related to VF have been reported in Riverside County between 2005 and 2008 (Williams 2009). A rate of 50 cases per year per 2,000,000 persons corresponds to a risk of about 25 in one million and a rate of 2.5 cases per 100,000 persons, which is lower than the average rate for the entire state of California (~3.6 cases per 100,000 residents). Data received from the Riverside County Department of Public Health indicates that the crude VF rate in Riverside County between 1999 and 2006 has been even lower, about 15 per 100,000 residents. The region in which the GSEP project would be located (between Blythe and Dessert Center) has recorded 5 or fewer cases between 1999 and 2006 (RCDPH 2007).

Worker Safety and Fire Protection Table 4: Valley Fever rates in Riverside County

County of Riverside			
Reported Cases: Coccidioidomycosis (Valley Fever)			
Years 1999 - 2006			
By Zip Code of Residence*			
ZIP	**PO_NAME**	**8 Year Total**	**8 Year Estimated Crude Aggregate Rate (per 10,000)**
92236	Coachella	5	1.7
92225	Blythe	5	2.8
92883	Corona	5	2.6
92591	Temecula	5	1.5
92201	Indio	6	1.0
92505	Riverside	6	1.4
92544	Hemet	7	1.6
92530	Lake Elsinore	7	1.4
92506	Riverside	7	1.5
92879	Corona	8	1.6
92507	Riverside	10	1.9
92583	San Jacinto	10	4.0
92570	Perris	11	2.5
92220	Banning	12	3.8
92586	Sun City	12	6.2
92509	Riverside	13	1.8
92504	Riverside	21	4.0
92503	Riverside	32	4.1
TOTAL	ALL COUNTY	280	1.5
*** only zip codes for which more than 4 cases were recorded during the 8-year period are included**			
Source: DHS: AVSS CMR reporting			
Compiled:			
Riverside County Department of Public Health			
Epidemiology and Program Evaluation			
Kevin Meconis, Epidemiologist			
11/19/2007			

A 1996 paper that tried to explain the sudden increase in Coccidioidomycosis cases that began in the early 90s found that the San Joaquin Valley in California has the largest population of C. immitis, which is found to be distributed unevenly in the soil and seems

to be concentrated around animal burrows and ancient Indian burial sites. It is usually found 4 to 12 inches below the surface of the soil. The paper also reported that incidences of coccidioidomycosis vary with the seasons; with highest rates in late summer and early fall when the soil is dry and the crops are harvested. Dust storms are frequently followed by outbreaks of coccidioidomycosis (Kirkland 1996). A modeling attempt to establish the relationship between fluctuations in VF incident rates and weather conditions in Kern County found that there is only a weak connection between weather and VF cases (weather patterns correlate with up to 4 percent of outbreaks). The study concluded that the factors that cause fluctuations in VF cases are not weather-related but rather biological and anthropogenic (i.e. human activities, primarily construction on previously undisturbed soil) (Talamantes 2007).

During correspondence with Dr. Michael MacLean of the Kings County Health Department, he noted that according to his experience and of those who study VF, it is very hard to find the fungus in soil that was previously farmed and irrigated, which greatly reduces the risk of infection resulting from disturbance of farmed lands. This does not apply to previously undisturbed lands where excavation, grading, and construction may correlate with increases in VF cases. Dr. MacLean feels that with the current state of knowledge, we can only speculate on the causes and trends influencing VF cases and he does not feel that construction activities are necessarily the cause of VF outbreaks (KCEHS 2009).

Valley Fever is spread through the air. If soil containing the fungus is disturbed by construction, natural disasters, or wind, the fungal spores get into the air where people can breathe in the spores. The disease is not spread from person to person. Occupational or recreational exposure to dust is an important consideration. Agricultural workers, construction workers, or others (such as archeologists) who dig in the soil in the disease-endemic area of the Central Valley are at the highest risk for the disease (CDC 2006; CDHS 2010). The risk for disseminated coccidioidomycosis is much higher among some ethnic groups, particularly African-Americans and Filipinos. In these ethnic groups, the risk for disseminated coccidioidomycosis is tenfold that of the general population (CDC 2006).

Worker Safety and Fire Protection Table 5: Disease Forms of Valley Fever

CATEGORIES	NOTES
Asymptomatic	• Occurs in about 50 percent of patients
Acute Symptomatic	• Pulmonary syndrome that combines cough, chest pain, shortness of breath, fever, and fatigue. • Diffuse pneumonia affects immunosuppressed individuals • Skin manifestations include fine papular rash, erythema nodosum, and erythema multiforme • Occasional migratory arthralgias and fever
Chronic Pulmonary	• Affects between 5 to 10 percent of infected individuals • Usually presents as pulmonary nodules or peripheral thin-walled cavities
Extrapulmonary/Disseminated Varieties	
Chronic skin disease	• Keratotic and verrucose ulcers or subcutaneous fluctuant abscesses
Joints / Bones	• Severe synovitis and effusion that may affect knees, wrists, feet, ankles, and/or pelvis • Lytic lesions commonly affecting the axial skeleton
Meningeal Disease	• The most feared complication • Presenting with classic meningeal symptoms and signs • Hydrocephalus is a frequent complication
Others	• May affect virtually any organ, including thyroid, GI tract, adrenal glands, genitourinary tract, pericardium, peritoneum

Given the available scientific and medical literature on Valley Fever, it is difficult for staff to assess the potential for VF to impact workers during construction and operation of the proposed GSEP with a reasonable degree of certainty. To minimize potential exposure of workers and also the public to coccidioidomycosis during soil excavation and grading, extensive wetting of the soil prior to and during construction activities should be employed and dust masks should be worn at certain times during these activities. The dust (PM10) control measures found in the Air Quality section of the SA/RSA should be strictly adhered to in order to adequately reduce the risk of workers contracting VF. To provide additional protection to workers that could experience elevated exposure during construction activities, staff proposes Condition of Certification **WORKER SAFETY-8** which would require that the dust control measures found in proposed Conditions **AQ-SC3** and **AQ-SC4** be supplemented with additional requirements including implementing methods equivalent to the requirements of Rule 402 of the Kern County Air Pollution Control District (as amended Nov. 3, 2004).

Fire Hazards

During construction and operation of the proposed GSEP project, there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, hydraulic fluid, mineral oil, insulating fluid at the power plant switchyard or flammable liquids, explosions, and over-heated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely to develop at power plants. Fires of heat transfer fluid such as that proposed for use in the solar panels at GSEP are rare. Compliance with all LORS would be adequate to assure protection from all fire hazards.

Staff reviewed the information provided in the AFC and spoke to representatives of the RCFD to determine if available fire protection services and equipment would adequately protect workers and to determine the project's impact on fire protection services in the area. The project will rely on both on-site fire protection systems and local fire protection services. The on-site fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the RCFD (RCFD 2010).

Construction

During construction, the permanent fire protection systems proposed for the GSEP would be installed as soon as practical; until then portable fire extinguishers would be placed throughout the site at appropriate intervals and periodically maintained. Safety procedures and training would be implemented according to the guidelines of the Construction Fire Protection and Prevention Plan (GSEP 2009a, Section 5.14.1.2).

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the 2007 California Fire Code, all applicable recommended NFPA standards (including Standard 850 addressing fire protection at electric generating plants), and all Cal/OSHA requirements, with the exception of providing a secondary access point for emergency response vehicles. Both the California Fire Code (24 CCR Part 9, chapter 5, section 503.1.2) and the Uniform Fire Code (sections 901 and 902) require that access to the site be reviewed and approved

by the fire department. All power plants licensed by the Energy Commission have more than one access point to the power plant site. This is sound fire safety procedure and allows for fire department vehicles and personal to access the site should the main gate be blocked. The proposed GSEP has only one access point, that being through the main gate located near the southeast corner of the site via a new main access road from an existing I-10 interchange, and the AFC makes no mention of a secondary access point through the perimeter fence (GSEP 2009a, Section 3.5.5 and Figure 3.4-1).

Staff finds that a second access point is necessary to ensure fire department access. This access point can be restricted to emergency use only and, if possible, the gate should be equipped with the fire department's Opticom System for remote keyless entry. Therefore, in order to comply with the requirements of LORS, staff proposes a Condition of Certification **WORKER SAFETY-6** that would require the project owner to identify and provide a second access point to the site for emergency vehicles and equip this secondary gate with either the Opticom System or a keypad for fire department personnel to open the gate.
The main – and only – planned access road to the Genesis site would be a paved road starting at the Wiley Wells Road interchange with I-10 and end ~6.5 miles later at the site. Staff, RCFD Fire Marshall Dale Evenson, and Assistant Fire Marshall Sonia Cooley are concerned that if a hazmat spill occurred along I-10 near the Wiley Wells Road, or at the Wiley Wells Road interchange or rest area, the spill could close off all access to the power plant. If a fire, hazmat, or EMS emergency were to occur at the power plant, the RCFD would not be able to travel through a hazmat cloud to gain access to the Genesis site and the power plant would effectively be isolated. If the spilled hazmat vapor cloud were to drift towards the Genesis site, evacuation of power plant personnel would be impossible. Furthermore, if an accident on or wash-out of the main access road were to block the road, once again the facility would be isolated.

A second road from I-10 to the site would have to go through sensitive habitat, would require extensive and time-consuming environmental and cultural assessment. The Bureau of Land Management (BLM) has tentatively and informally identified an existing dirt road coming off the Ford Lake interchange and heading northeast onto the Genesis site, a distance estimated at >7 miles, as a possible route for a second road. However staff remains very skeptical of placing a 24-foot wide all-weather gravel road at this location due to the many biological and cultural areas the road would impact. Staff reviewed this matter with the RCFD and decided that a reasonable alternative would be the placement of a gravel "spur" road directly from I-10 (through the Caltrans right-of-way fence) approximately ½ mile west of the Wiley Wells Road interchange and headed north to intercept the paved main access road. Although this access road would be only ½ mile from the Wiley Wells Road, it would provide sufficient degree of protection and at the same time avoid sensitive habitat and cultural areas.

Fire suppression elements in the proposed plant would include both fixed and portable fire extinguishing systems. The fire water would be supplied from on-site wells and stored in two water storage tanks (one per unit) with a dedicated fire protection supply of 360,000 gallons in each. One electric and one diesel-fueled backup firewater pump would supply water to each unit's fire protection loop and two electric jockey pumps would maintain pressure in the systems (GSEP 2009a, Section 5.14.1.3).

Fire hydrants would be installed throughout the site per NFPA requirements and a sprinkler deluge system would be installed in areas of risk including each unit's transformer, HTF expansion tank, and HTF circulating pump area. A sprinkler system would be installed at the steam turbine generator (STG) and in administrative buildings. In addition to the fixed fire protection system, appropriate class of service portable extinguishers and fire hydrants/hose stations would be located throughout the facility at code-approved intervals. The solar fields would be protected by isolation valves that would allow only a finite amount of HTF to burn before extinguishing (GSEP 2009a, Section 5.14.1.3).

According to NFPA standards and Universal Fire Code (UFC) requirements, the fire protection system must have fire detection sensors and monitoring equipment that would trigger alarms and automatically actuate the suppression systems. Staff has determined that these systems will ensure adequate fire protection.

The applicant would be required by Conditions of Certification **WORKER SAFETY-1** and**-2** to provide the final Fire Protection and Prevention Program to staff and to the RCFD prior to construction and operation of the project to confirm the adequacy of the proposed fire protection measures.

In two letters from the RCFD (RCFD 2010a and 2010b), Captain Neuman of the RCFD has stated that the GSEP would have an impact on Riverside County Fire Department's ability to respond to fire, HazMat, and EMS emergencies at the GSEP. He also stated that the three solar projects proposed for the I-10 corridor (Blythe, Genesis, and Palen) plus the proposed Rice solar project would also have a cumulative adverse impact on the RCFD's ability to provide an acceptable level of service. The RCFD based its analysis on their categories of industrial facilities, the type and level of service needed for projects in each category, the appropriate response times needed for each category, and the level of response required for the GSEP. The RCFD determined that, due to the remote location of the GSEP and the other two solar power plants and the expansive nature of solar arrays at the GSEP (up to 10 sq. miles), the response time from the RCFD's existing facilities would be inadequate and that a new fire station more closely located to these solar power plants and adequately equipped and staffed would be necessary. The initial response time for a fire would be 28 minutes from Station 45 and 40 minutes from Station 49 and both those stations would only be able to send out one engine each with three firefighters each. This is because each station must leave at least one engine in reserve at all times and the minimum number of firefighters on-duty at all times is three at each station. If an emergency response due to a fire is required, RCFD Standard Operating Procedures call for at least six engines to be dispatched, with three firefighters on each engine and one battalion chief for a total of 19 fire fighters on the scene. The other engines would have to be dispatched for more remote fire stations. There is also the standard procedure of "back-fill" at the stations that are responding to an emergency. Rather than leave the territory unprotected, the RCFD may move equipment or personnel to the vacated station.

Staff has considered the position of the RCFD and all relevant information as well as past experience at existing solar power plants that are similar to but smaller than the proposed project. Staff reviewed the records of emergency responses of the San Bernardino County Fire Department (SBCFD) to the only three thermal solar power

plants in the state. These are the Solar Electric Generating Station (SEGS) 1 & 2 in Daggett (operating since 1984), SEGS 3-7 at Kramer Junction (1989), and SEGS 8 & 9 at Harper Dry Lake (1989). Staff also reviewed what records were immediately available at the three solar plants. All sources stated that their records were incomplete and not comprehensive. (Note: Staff wishes to caution that since the number of thermal solar power plants is so few and their operating history so short, any conclusion as to accident incident rates is meaningless from a statistical perspective. Simply put, the data set is not robust enough to draw any conclusions about their safety records. Nevertheless, this information is provided for illustrative purposes.)

Three types of fire department responses to the solar power plants were surveyed:

1. Plan reviews

2. Hazmat and fire inspections

3. Emergency Response including medical, fire, rescue, and hazardous materials incidents

Regarding visits to the sites for plan review during the years the plant was operating, the SBCFD made four visits to the Kramer Junction facility and one visit to the Harper Lake facility.

Regarding site visits for inspections, reviews, enforcement activities, and follow ups, the SBCFD made 10 inspections to Daggett since 2008, totaling 24 hours of time, 48 visits to Kramer Junction since 2003, totaling 128 hours of time, and 29 visits to Harper Lake since 2004, totaling 105 hours of time.

Regarding emergency response including fire, rescue, medical and hazardous materials incidents, approximately 30 incidents occurred since 1998 that required the SBCFD (and other fire stations through mutual aid agreements) to respond to the three solar power plant sites. These include fires, fire alarm activations, injuries, medical emergencies, hazardous materials spills, complaints/calls from the public, and false alarms. However, the available records did not include documentation of a major fire at the SEGS 8 facility in January of 1990 that required a large part of the regional resources from 4 different fire districts including the San Bernardino, Edwards Air force base, CDF, and the Kern County Fire Departments. This fire is the largest incident that has occurred at a solar thermal plant in California and demonstrates the magnitude of fire department resources that can be required to respond to a fire at a large thermal solar facility.

According to the Daggett solar plant records, only three incidents in the life of the plant required emergency services:

1. Feb 25, 1999: An HTF fire occurred in the HTF tanks. This was a major fire and the fire department allowed the fire to burn itself out over 2 days. There were no injuries, but extensive damage occurred.

2. Feb 28, 2000: An employee had a suspected heart attack (which was actually caused by drinking a whole bottle of hot sauce), and an ambulance responded from the fire department.

3. May 15-17, 2010: An HTF spill of about 60 gallons occurred in the solar field. The facility personnel cleaned it up on May 15 and reported it to San Bernardino County on the next business day, May 17. When receiving the report the dispatcher misunderstood the report and sent out a 911 call indicating a spill is in progress. The whole fire department showed up on scene.

According to information received from the Kramer Junction plant, the following incidents required fire department response:

1. August 2002 for an unknown HazMat incident.

2. In 2007 when 30,000 gallons of HTF spilled.

3. In Feb. 2009 when a flex hose failure and a vapor cloud ignited. According to Kramer Junction plant officials, the fire department was not needed as plant staff had the situation under control. A concerned citizen had made a 911 call.

According to information received from the Harper Lake plant, only the January 1990 fire required fire department response.

To summarize, relying on sparse data received from the SBCFD for only the past 10 years and not including the 1990 SEGS 8 fire, the department responded to about 30 incidents and emergencies at the nine solar units, including two fires and two hazardous materials spills. During the same period the SBCFD conducted approximately 90 inspections and visits for enforcement actions/plan reviews, totaling about 260 hours of personnel time. The incident rate, therefore, for all three power plants would be 30 in 12 years or 2.5 emergency calls per year or 0.83 emergencies per solar plant per year.

The proposed facility would be located in an area that is currently served by the RCFD. Within 30 miles are several other fire departments including that of the City of Blythe and the Chuckawalla Valley State Prison (CVSP) which has a fire department manned by inmate firefighters and led by a professional Fire Chief and Captain. According to Captain Smith of the CVSP Fire Department (CVSPFD), they have responded to RCFP requests for mutual aid and would be willing to do so for the solar power plants if requested by RCFD. Captain Smith confirmed that they have two fire engines but that only one is available for off-site mutual aid. Depending upon the day and availability of inmate firefighters, he would be able to respond with one engine and three to six firefighters. The CVSPFD firefighters are trained in wild land, structural, and industrial fire-fighting. They have confined space and trench rescue training and equipment, are trained as hazmat first responders (California State Fire Marshal approved), but have only basic life support (BLF) and no EMT capability.

Riverside County does not have a “county” fire department per se and instead the county contracts with Cal Fire, which is a state agency under the California Department of Forestry and Fire Protection that also includes the Office of the California Fire Marshall. The RCFD, however, does speak for Riverside County and in a May 20, 2010

e-mail, Captain Newman of the RCFD stated that the RCFD does not have an “auto aid agreement” with the CVSPFD and that the prison fire department cannot be relied upon as a primary responder. The RCFD is the Authority Having Jurisdiction to the Genesis solar power plant and will provide the initial response. The RCFD currently does not have a mutual aid agreement with any other fire department in the county.

The proposed Genesis solar power plant, as well as the other proposed solar power plants along the I-10 corridor (Blythe and Palen), is very different from the light industry and residential development in the Riverside County desert region. It is also very different from the natural gas power plants built (BEP I and planned BEP II) in the Blythe area as well as the existing solar plants located at Harper Lake and Kramer Junction in San Bernardino County. These new solar power plants are much larger in scale than the existing solar power plants and all will have huge amounts of highly flammable heat transfer fluid used and stored on site, as much as 2,000,000 gallons for the GSEP. Other solar power plants (Blythe and Palen) will also have large fuel depots storing in excess of 20,000 gallons of diesel and gasoline during construction and perhaps even during operations while the Palen solar project would also store in excess of 75,000 lbs of Liquefied Petroleum Gas (LPG). The amount of highly flammable fuel stored and used on-site, combined with the rather remote locations of the Genesis, Palen, and Blythe solar projects and the potential for escalation of a small fire into a large conflagration, presents an emergency response challenge never before experienced by the RCFD.

The RCFD is not adequately equipped to respond to fire, hazmat, rescue, and EMS emergencies in a timely manner at the Genesis solar power plant. Staff has visited the RCFD fire station at Blythe Air Base (Station #45) and at Lake Tamarisk (Station #49). The stations are small and outdated with little room for firefighters. Station 45 has adequate bays for three engines but Station #49 at Lake Tamarisk Station did not. A structure without an open back-end had to be added to accommodate a new third fire engine, thus requiring that the engine be moved out of the bay for maintenance.

As described above, the standard fire department responses for a fire and for a hazmat spill include response of six engines and at least three firefighters on each engine. To fight a fire inside a structure, the RCFD must adhere to standard operating procedures and Cal-OSHA regulations that require “two men in”, “two men out”. Thus, a response of three firefighters from one station would not allow firefighters to attack a fire from within a structure or conduct a rescue. Confined space and collapsed trench rescues would also be problematic with only three firefighters. Therefore, no matter what size the fire or how many workers are initially in need of rescue, the RCFD would dispatch engines from at least three fire stations so that at a minimum, nine firefighters are sent to the scene. The RCFD would eventually dispatch a total of 9 engines to a fire to prevent escalation but would delay dispatch of additional engines if the first engine on the scene reported only a minor incident. Even if mutual aid was available and a mutual aid pact was in effect, the RCFD would still have to respond to an emergency at the Genesis site because it is the Authority Having Jurisdiction. Staff also notes that budgetary shortfalls that will impact fire services are common today and Riverside County is no exception.

Additionally, it is very important to note that the Genesis power plant (along with the other solar power plants) will be located in an extremely harsh desert environment. The

ability of a fire fighter to perform duties while wearing a turn-out coat, heavy boots, and a respirator (self contained breathing apparatus) is limited under the best of circumstances. If conducting a rescue or fighting a fire that necessitates use of a respirator, the high-temperatures of the desert, often exceed 115° F, severely limits a fire fighter's ability to perform the duties to 15 minutes at a time. This severe time restriction necessitates the mobilization of more firefighters to respond to the emergency.

Staff has considered the position of the RCFD and all relevant information as well as past experience at existing solar power plants that are similar to the proposed project. The proposed facility would be located in an area that is currently served by the RCFD. The fire, HazMat, and EMS needs at the proposed plant are real and would pose significant added demands on local fire protection services. In addition, staff finds that the RCFD's Hazmat Response Team is not adequately equipped and staffed to respond to hazardous materials incidents at the proposed facility with an adequate response time due to the great distance involved. Staff concurs with the assessment of the RCFD and has determined that the GSEP would cause significant direct and cumulative impacts on the local fire department. Staff also noted that a significant potential exists for a fire to escalate not only within the solar power plant but beyond the power plant into a wild land fire. Even though this is a desert environment, the scrub grasses and native plants are concentrated enough to sustain a wild fire.

Furthermore, emergency response will be needed during construction as well as the time until complete build-out which could be as long as six years. The fact that a fuel depot will be on site also speaks to the need for emergency response. Because it would take at least 16 to 18 months for the RCFD to locate, permit, and construct a new fire station, temporary mitigation will be required.

Staff's Proposed Mitigation

Regarding potential mitigation, Captain Neuman implied that, in general, the impacts could be mitigated at least in part to a level of insignificance if the developers of all four currently- proposed solar projects participate in the "Development Impact Fee Programs" adopted by the Riverside County Board of Supervisors. In two personal communications via telephone (February 10, 2010), staff discussed these impacts and the potential for mitigation with Captain Neuman and Mr. Ross of the Riverside County Planning Department. It is uncertain whether the solar power plants located on Federal BLM land would be required to participate in the County's fee program. Therefore, staff is proposing Condition of Certification **WORKER SAFETY- 7** that requires the Genesis Solar Energy Plant to either negotiate a mitigation fee agreement with the RCFD, form and join a solar industry group or association that will provide membership to all thermal solar power plants located within the jurisdiction of the RCFD to negotiate payment for their project-related shares of capital and operating costs to build and operate new fire protection/response infrastructure and provide appropriate equipment as mitigation of project-related impacts on fire protection services, or fund fire department capital improvements in the amount of $850,000 and to make an annual payment of $375,000 to mitigate both its individual impact on the fire department and its share of a cumulative impact on the fire department. Staff is proposing that the other three thermal solar projects proposed for Riverside County (Blythe Solar Power Project, Palen Solar Power

Project, and the Rice Solar Energy Project) make the same payments. The $850K for capital improvements is one-quarter of the amount estimated by the RCFD needed to fund a new fire station along I-10 near the Ford Dry Lake Road interchange and one new fire engine. The yearly payment of $3.75K is one-quarter the estimated amount needed to fund O&M for the station and the salaries of three firefighters. Staff understands that an allocation of equal amounts to each project may not be the only approach. To address this, staff is also proposing that the Commission alternatively accept fees negotiated to the satisfaction of the RCFD from a power generation industry association or group. This association or group could provide membership to power plants located within the jurisdiction of the RCFD in order to negotiate payment for their project-related shares of capital and operating costs to build and operate new fire protection/response infrastructure and provide appropriate equipment as mitigation of project-related impacts on fire protection services. The association should be able to raise funds, negotiate payment for emergency response services with the RCFD, audit County and Fire department fire protection/emergency response expenditures to ensure that funds go towards emergency response needs, and develop and implement an appropriate fee structure for its members that involves the re-payment of funds initially provided by its members upon the joining of new members, and project characteristics (e.g., size, technology chemical usage, or project location relative to infrastructure).

Also, towards the goal of developing a power industry association, staff has developed an Emergency Response Decision Matrix that staff, the fire departments, and project owners may use to assess the level of emergency response need. This analytical tool has a weighting scheme for the various categories of fire department response but does utilize professional judgment in the assignment of the “score” to the categories. Staff has tested this methodology on existing and planned solar power plants and finds it to be useful but cautions against using it as the sole basis for determining need or for allocating financial responsibility for direct individual or cumulative impacts.

Regarding temporary mitigation while construction of a new fire station is conducted, since project-related impacts to the RCFD begin immediately, the project owner will be required to make the first annual payment for additional firefighters before construction begins and continue with those annual payments through decommissioning. In a personal conversation with Captain Neumann on June 1, 2010, staff learned that although the need for additional firefighters exists from the start, immediately adding firefighters to the nearest fire station (Station 45 at the Blythe airport) is not easily accomplished. The station is equipped with two engines and one must be kept as a reserve at all times as per code and practice. The engine in use can only accommodate four firefighters as it is equipped with four seats and four self-contained breathing apparatus. Since the need will be urgent upon the start of construction of the GSEP, the additional firefighters funded by the project will have to be dispersed to other stations until a new station can be completed.

Emergency Medical Services Response

Staff conducted a statewide survey to determine the frequency of Emergency Medical Services (EMS) response and off-site fire-fighter response for natural gas-fired power plants in California. The purpose of the analysis was to determine what impact, if any, power plants may have on local emergency services. Staff has concluded that incidents

at power plants that require fire or EMS response are infrequent and represent an insignificant impact on the local fire departments, except for rare instances where a rural fire department has mostly volunteer fire-fighting staff. However, staff has determined that the potential for both work-related and non-work-related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work-related incidences, including those involving visitors.

The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site automatic external defibrillator (AED); the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations (e.g., airports, factories, government buildings) maintaining on-site cardiac defibrillation devices. Therefore, staff concludes that, with the advent of modern cost-effective cardiac defibrillation devices, it is proper in a power plant environment to maintain such a device and the trained staff on site in order to treat cardiac arrhythmias resulting from industrial accidents or other non-work related causes.

Staff proposes Condition of Certification **WORKER SAFETY-5,** which would require that a portable AED be located on site, that all power plant employees on site during operations be trained in its use, and that a representative number of workers on site during construction and commissioning also be trained in its use.

Closure and Decommissioning Impacts and Mitigation

Closure of the proposed GSEP (temporary or permanent) would follow a facility closure plan prepared by the applicant and designed to minimize public health and environmental impacts. Staff expects that impacts from the closure and decommissioning process would represent a fraction of the impacts associated with the construction or operation of the proposed GSEP. Therefore based on staff's analysis for the construction and operation phases of this project, staff concludes that hazardous materials-related impacts from closure and decommissioning of the GSEP would be insignificant.

C.14.4.3 CEQA LEVEL OF SIGNIFICANCE

Staff's analysis of Worker Safety and Fire Protection impacts from the proposed GSEP has determined that impacts would be below the level of significance if the proposed mitigation is implemented.

C.14.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so impacts are reduced, and (2) by eliminating the eastern solar field, which is located on flowing desert washes, it would reduce impacts to the sand dune and playa areas and to the Mojave Fringe-toed Lizard habitat. The alternative would also reduce impacts to wildlife movement by

reducing obstruction of the Palen wash and would maintain, thru both fluvial and Aeolian processes, the dune and sandy habitats. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

C.14.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

C.14.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction of the Reduced Acreage Alternative is likely to require fewer employees which would reduce the impacts to worker safety. Similarly, this alternative may have reduced impacts in the area of fire protection due to the smaller amounts of flammable/hazardous materials and potential ignition sources that would exist with this alternative. However, the reduced impacts in the area of Worker Safety and Fire Protection would be minor, and staff has determined that the project as proposed would have less than significant impacts in the area of Worker Safety and Fire Protection if the proposed mitigation is implemented. Therefore the Reduced Acreage Alternative is not preferable over the project as proposed.

C.14.5.3 CEQA LEVEL OF SIGNIFICANCE

Staff has determined that impacts in the area of Worker Safety and Fire Protection associated with either the GSEP as proposed or the Reduced Acreage Alternative would be below the CEQA level of significance. The same conditions of certification would be required for the Reduced Acreage Alternative and the project as proposed.

C.14.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP

2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources but not have any impact on worker safety and fire protection.

C.14.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

C.14.6.2 Assessment of Impacts and Discussion of Mitigation

The risk to workers and the impacts on fire protection would not change significantly with any of the cooling technologies. This is mostly due to the generic nature of worker and fire protection required at a power plant licensed by the Energy Commission.

C.14.6.3 CEQA Level of Significance

The overall impacts of the project with dry cooling would be the same as those of the proposed project; both would have less than significant impacts in the area of worker safety and fire protection.

C.14.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three (3) No Project/No Action Alternatives evaluated in this section, as follows:

C.14.7.1 NO ACTION ON PROPOSED PROJECT APPLICATION AND ON CDCA LAND USE PLAN AMENDMENT

Under this alternative, the proposed Genesis Solar Energy 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. As a result, no construction safety and health and project operations and maintenance safety and health programs would be required and no impacts on local fire protection services would be created. 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.

C.14.7.2 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAN USE PLAN TO MAKE THE AREA AVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed Genesis Solar Energy 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 will be developed with another solar technology. Construction and operation requirements for solar technologies vary. However, it is expected that construction safety and health and project operations and maintenance safety and health programs would be required for all solar technologies and impacts to local fire protection services would be potentially generated. As such, it is expected that the impacts to worker safety and fire protection from a different solar technology would likely be similar to impacts from the proposed project.

C.14.7.3 NO ACTION ON PROPOSED PROJECT APPLICATION AND AMEND THE CDCA LAND USE PLAN TO MAKE THE AREA UNAVAILABLE FOR FUTURE SOLAR DEVELOPMENT

Under this alternative, the proposed Genesis Solar Energy 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 so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no construction or operation of a solar facility. No construction safety and health and no maintenance safety and health programs would be required and no demands on local fire protection services would be made. Therefore, this No Project/No Action Alternative would not result in impacts to worker safety and fire protection. 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.14.8 CUMULATIVE IMPACTS

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 Figure 1** 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 2, I-10 Corridor 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 I-10 Corridor 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 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/DPA/DEIS.

C.14.8.1 GEOGRAPHIC SCOPE OF ANALYSIS

The geographic areas considered for cumulative impacts on Worker Safety/Fire Protection are within the project boundaries and regional impacts.

C.14.8.2 EFFECTS OF PAST AND PRESENT PROJECTS

For this analysis, there are three projects or developments in the area or region that would require the response from off-site fire departments for fire, HazMat, or EMS emergencies that staff has found to have an impact on the region. The need for fire department response to solar power plants may not be frequent but past experience has shown that there is a significant chance that it will occur. Two power plants in the area - the Blythe Power plants I and II - are not considered by staff to have had an impact on the area.

Staff has analyzed the potential for **Worker Safety/Fire Protection** cumulative impacts at many other power plant projects in California. A significant cumulative Worker Safety/Fire Protection impact is defined as the simultaneous need for a fire department to respond to multiple locations such that its resources and those of the mutual aid fire departments (which routinely respond in every-day situations to emergencies at residences, commercial buildings, and heavy industry) are over-whelmed and cannot effectively respond. Existing locations that might require a fire department response along with those facilities which might likely be built were considered. Staff believes that cumulative impacts are both possible and probable because despite the many safeguards implemented to prevent and control fires, HazMat releases, and injuries/accidents, the locations of the existing facilities are distant from the GSEP site and the RCFD fire stations such that the response times and equipment are not adequate. Staff therefore believes the cumulative impacts from existing facilities on the local fire department would be significant should the GSEP be built and operated.

C.14.8.3 EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

Worker Safety/Fire Protection at the proposed project is also expected to be affected by reasonably foreseeable future projects, including the proposed Blythe and Palen solar projects proposed for the I-10 corridor.

Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction. The construction of the GSEP is expected to result in short term adverse impacts related to Worker Safety/Fire Protection during construction activities. It is expected that some of the cumulative projects described above which are not yet built may be under construction the same time as the GSEP and therefore short term impacts related to Worker Safety/Fire Protection during construction of those cumulative projects may occur.

Operation. The operation of the GSEP is expected to result in long term adverse impacts during operation of the project related to Worker Safety/Fire Protection. Staff has analyzed the potential for Worker Safety/Fire Protection cumulative impacts at many other power plant projects in California. A significant cumulative Worker Safety/Fire Protection impact is defined as the simultaneous need for a fire department to respond to multiple locations such that its resources and those of the mutual aid fire departments (which routinely respond in every-day situations to emergencies at residences, commercial buildings, and heavy industry) are over-whelmed and cannot effectively respond. Existing locations that might require a fire department response along with those facilities which might likely be built were considered. Staff believes that cumulative impacts are possible and although they are not highly probable because of the many safeguards implemented to both prevent and control fires, HazMat releases, and injuries/accidents, due to their distant locations and wide expansive sites, cumulatively they present a significant impact. Additionally, even though the chances of two or more solar power plants requiring emergency response simultaneously may be low, once again a response to one distant site would preclude a simultaneous response to another solar plant or even a residential or commercial location in a timely and adequate manner due to the great distances involve. Staff therefore believes the impacts on the local fire department would be cumulatively significant.

The applicant will develop and implement a fire prevention program for the GSEP independent of any other projects considered for potential cumulative impacts and will be required to fund capital improvements and staffing for the RCFD. Staff believes that the facility, as proposed by the applicant and with the additional mitigation measures proposed by staff, will then have an insignificant impact on fire, HazMat, or EMS response. Therefore, staff concludes that with mitigation, the GSEP's contribution to a Worker Safety/Fire Protection cumulative impact would be less than significant.

Decommissioning. The decommissioning of the GSEP is not expected to result in adverse impacts related to Worker Safety/Fire Protection. 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, it is not expected that significant impacts related to Worker Safety/Fire Protection during decommissioning of the GSEP generated by the cumulative projects will occur.

C.14.9 COMPLIANCE WITH LORS

Staff concludes that construction and operation of the GSEP project would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of worker safety and fire protection.

C.14.10 NOTEWORTHY PUBLIC BENEFITS

The construction and staffing of a new fire station in the county is a noteworthy pubic benefit in the area of Worker Safety/Fire Protection.

C. 14.11 RESPONSE TO AGENCY AND PUBLIC COMMENTS

No comments have been received on the topics of worker safety or fire protection other than from the Riverside County Fire Department. Their comments are mentioned above and referenced below.

C.14.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

WORKER SAFETY-1 The project owner shall submit to the Compliance Project Manager (CPM) a copy of the Project Construction Safety and Health Program containing the following:

- a Construction Personal Protective Equipment Program;
- a Construction Exposure Monitoring Program;
- a Construction Injury and Illness Prevention Program;
- a Construction heat stress protection plan that implements and expands on existing Cal OSHA regulations as found in 8 CCR 3395;
- a Construction Emergency Action Plan; and
- a Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, the Heat Stress Protection Plan, and the Injury and Illness Prevention Program shall be submitted to the CPM for review and approval concerning compliance of the program with all applicable safety orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the Riverside County Fire Department for review and comment prior to submittal to the CPM for approval.

Verification: At least 30 days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction Safety and Health Program.

WORKER SAFETY-2 The project owner shall submit to the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- an Operation Injury and Illness Prevention Plan;
- an Operation heat stress protection plan that implements and expands on existing Cal OSHA regulations (8 CCR 3395);
- a Best Management Practices (BMP) for the storage and application of herbicides;
- an Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Plan (8 Cal Code Regs. § 3221); and
- Personal Protective Equipment Program (8 Cal Code Regs, §§ 3401—3411).

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, Heat Stress Protection Plan, BMP for Herbicides, and Personal Protective Equipment Program shall be submitted to the CPM for review and comment concerning compliance of the programs with all applicable safety orders. The Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the Riverside County Fire Department for review and comment.

Verification: At least 30 days prior to the start of first-fire or commissioning, the project owner shall submit to the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards; is capable of identifying workplace hazards relating to the construction activities; and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- have overall authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;
- assure that all construction and commissioning workers and supervisors receive adequate safety training;
- complete accident and safety-related incident investigations and emergency response reports for injuries and inform the CPM of safety-related incidents; and
- assure that all the plans identified in Conditions of Certification **WORKER SAFETY-1** and **-2** are implemented.

Verification: At least 60 days prior to the start of site mobilization, the project owner shall submit to the CPM the name and contact information for the Construction Safety Supervisor (CSS). The contact information of any replacement CSS shall be submitted to the CPM within one business day.

The CSS shall submit in the Monthly Compliance Report a monthly safety inspection report to include:

- record of all employees trained for that month (all records shall be kept on site for the duration of the project);
- summary report of safety management actions and safety-related incidents that occurred during the month;
- report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- report of accidents and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the Chief Building Official (CBO) for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO and will be responsible for verifying that the Construction Safety Supervisor, as required in Condition of Certification Worker Safety-3, implements all appropriate Cal/OSHA and Energy Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

Verification: At least sixty (60) days prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on site whenever the workers that they supervise are on site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to the CPM for review and approval.

Verification: At least 60 days prior to the start of site mobilization, the project owner shall submit to the CPM proof that a portable automatic external defibrillator (AED) exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall:

a. Provide a second access gate for emergency personnel to enter the site. This secondary access gate shall be at least one-quarter mile from the main gate and shall be accessed via a gravel road off the main road near the facility fence line.

b. Provide a "spur" road that starts at a gate in the I-10 right-of-way not closer than ½ mile west of the Wiley Wells Road interchange with I-10 and which connects to the main access road approximately ½ mile to the north. The "spur" road shall be at a minimum an all-weather gravel road, at least 24 feet wide, and with culverts to direct flow under the road at any wash the road may cross.

c. Maintain the main access road and the "spur" road and provide a plan for implementation.

Plans for the secondary access gate, the method of gate operation, gravel road, "spur" road, and to maintain the roads shall be submitted to the Riverside County Fire Department for review and comment and to the CPM for review and approval.

Verification: At least sixty (60) days prior to the start of site mobilization, the project owner shall submit to the Riverside County Fire Department and the CPM preliminary plans showing the location of a second access gate to the site, a description of how the gate will be opened by the fire department, and a description and map showing the location, dimensions, and composition of the main road, the gravel road to the second gate, and the gravel "spur" road. At least thirty (30) days prior to the start of site mobilization, the project owner shall submit final plans plus the road maintenance plan to the CPM review and approval. The final plan submittal shall also include a letter containing comments from the Riverside County Fire Department or a statement that no comments were received.

WORKER SAFETY-7 The project owner shall either:

(1) Reach an agreement, either individually or in conjunction with a power generation industry association or group that negotiates on behalf of its members, with the Riverside County Fire Department (RCFD) regarding funding of its project-related share of capital and operating costs to build and operate new fire protection/response infrastructure and provide appropriate equipment as mitigation of project-related impacts on fire protection services within the jurisdiction.

or

(2) Shall fund its share of the capital costs in the amount of $825,000 and provide an annual payment of $375,000 to the RCFD for the support of new fire department staff and operations and maintenance commencing with the start of construction and continuing annually thereafter on the anniversary until the final date of power plant decommissioning.

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Verification: At least sixty (30) days prior to the start of site mobilization, the project owner shall provide to the CPM:

(1) A copy of the individual agreement with the RCFD or, if the owner joins a power generation industry association, a copy of the bylaws and group's agreement/contract with the RCFD.

or

(2) Documentation that the amount of $850,000 has been paid to the RCFD, documentation that the first annual payment of $375,000 has been made, and shall also provide a statement in the Annual Compliance Report that subsequent annual payments have been made.

WORKER SAFETY-8 The project owner shall develop and implement an enhanced Dust Control Plan that includes the requirements described in **AQ-SC3** and additionally requires:

i. site worker use of dust masks (NIOSH N-95 or better) whenever visible dust is present;

ii. implementation of methods consistent with Rule 402 of the Kern County Air Pollution Control District (as amended Nov. 3, 2004); and

iii. implementation of enhanced dust control methods (increased frequency of watering, use of dust suppression chemicals, etc. consistent with **AQ-SC4**) immediately whenever visible dust comes from or onto the site or when PM10 measurements (obtained when implementing section ii above) exceed 50 $\mu g/m^3$.

Verification: At least sixty (60) days prior to the commencement of site mobilization, the enhanced Dust control Plan shall be provided to the CPM for review and approval.

WORKER SAFETY-9 The project owner shall participate in joint training exercises with the Riverside County Fire Department (RCFD). The project owner shall coordinate this training with other Energy Commission-licensed solar power plants within Riverside County such that this project shall host the annual training on a rotating yearly basis with the other solar power plants.

Verification: At least ten (10) days prior to the start of commissioning, the project owner shall submit to the CPM proof that a joint training program with the RCFD is established. In the annual compliance report to the CPM, the project owner shall include the date, list of participants, training protocol, and location of the joint training.

C.14.13 CONCLUSIONS

Staff concludes that if the applicant for the proposed GSEP project provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program as required by Conditions of Certification **WORKER SAFETY-1**, and **-2** and fulfills the requirements of Condition of Certification **WORKER SAFETY-3** through**-9**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the operation of this power plant, with mitigation, would not significantly impact the local fire department. Furthermore, adherence to staff's proposed conditions

would reduce the risk of workers or the public contracting Valley Fever to a less than significant level.

C.14.14 REFERENCES

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D. ENGINEERING ANALYSIS

D.1 - FACILITY DESIGN

Testimony of Shahab Khoshmashrab

D.1.1 SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that the design, construction, and eventual closure of the project and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations and standards.

D.1.2 INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Genesis Solar Energy Project (GSEP) and is not intended as a California Environmental Quality (CEQA). The purpose of this analysis is solely to:

- Verify that the laws, ordinances, regulations and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- Verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project would be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- Determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- Describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- Identification of the engineering LORS that apply to facility design;
- Evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety;
- Proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- Conditions of certification proposed by staff to ensure that the project would be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

D.1.3 LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (GSEP 2009a). Key LORS are listed in **Facility Design Table 1,** below:

FACILITY DESIGN Table 1
Key Engineering Laws, Ordinances, Regulations and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2007 California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	Riverside County regulations and ordinances
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

D.1.4 PROPOSED PROJECT

D.1.4.1 SETTING AND EXISTING CONDITIONS

The GSEP would be built on a site located in Riverside County, California. For more information on the site and its related project description, please see the **Project Description** section of this document. Additional engineering design details are contained in the AFC (GSEP 2009a, AFC § 3.11).

D.1.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes and ensure public health and life safety. This analysis further verifies that applicable engineering LORS have been identified and that the project and its ancillary facilities have been described in adequate detail. It also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme that would verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access, in addition to the criteria for designing and

constructing linear support facilities such as natural gas and electric transmission interconnections. The applicant proposes the use of accepted industry standards (see GSEP 2009a, Section 3.11 for a representative list of applicable industry standards), design practices, and construction methods in preparing and developing the site. Staff concludes that this project, including its linear facilities, would most likely comply with all applicable site preparation LORS, and proposes conditions of certification (see below and the **Geology and Paleontology** section of this document) to ensure that compliance.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS. Major structures and equipment are identified in the proposed Condition of Certification **GEN-2**, below. Typically, **Facility Design Table 2** in Condition of Certification **GEN-2** lists the major structures and equipment identified in the AFC and other project related information available before project licensing; this list is based on the preliminary design of the project. The master drawing and master specifications lists described in Condition of Certification **GEN-2**, however, include the project-related documents based on the project's detailed design and may include additional documents for structures and equipment not identified in **Facility Design Table 2**. (Detailed project design typically occurs after project licensing and is not available at this time.)

GSEP shall be designed and constructed to the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2007 CBSC takes effect, the 2007 CBSC provisions shall be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included condition of certification **STRUC-1**, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

PROJECT QUALITY PROCEDURES

The project's AFC (GSEP 2009a, Appendix A and Sections 3.5 and 5.5.6) describes a quality program intended to inspire confidence that its systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards. Compliance with design

requirements will be verified through specific inspections and audits. Implementation of this quality assurance/quality control (QA/QC) program will ensure that GSEP is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under Section 104.2 of the CBC, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission itself serves as the building official, and has the responsibility to enforce the code, for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by Section 104.2.2 of the CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates typically include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC, pays the cost of these reviews and inspections. While building permits in addition to Energy Commission certification are not required for this project, the applicant pays in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff will invite Riverside County or a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, Energy Commission staff will complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification to ensure public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who will design and build the proposed project (conditions of certification **GEN-1** through **GEN-8**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction (subject to CBO review and approval) be approved by the CBO before it is performed. They also require that qualified special inspectors perform or oversee special inspections required by all applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) which could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval process.

D.1.4.3 CEQA LEVEL OF SIGNIFICANCE

As described in the **Introduction** above, the Facility Design section addresses LORS consistency and provides the agencies a vehicle for verifying compliance with these LORS during construction and operation of power generating facilities. This section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.5 REDUCED ACREAGE ALTERNATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.6 DRY COOLING ALTERNATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.8 NO PROJECT / NO ACTION ALTERNATIVE

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.9 CUMULATIVE IMPACT ANALYSIS

The Facility Design section is not intended to address environmental impacts under either CEQA or NEPA.

D.1.10 COMPLIANCE WITH LORS

A detailed discussion of the proposed project's compliance with LORS applicable to facility design is provided above in subsection D.1.4.2.

D.1.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with this Facility Design section.

D.1.12 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the CBO for review and approval (the CBSC in effect is the

edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility. All transmission facilities (lines, switchyards, switching stations and substations) are covered in the conditions of certification in the **Transmission System Engineering** section of this document.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2007 CBSC is in effect, the 2007 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

Verification: Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to the CPM a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO.

Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish the CPM and the CBO with a schedule of facility design submittals, and master drawing and master specifications lists. The schedule shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM upon request.

Verification: At least 60 days (or a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, the master drawing and master specifications lists of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures and equipment listed in **Facility Design Table 2**, below. Major structures and equipment shall be added to or deleted from the table only with CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

Facility Design Table 2
Major Structures and Equipment List

Equipment/System	Quantity (Plant)
Steam Turbine Generator Foundation and Connections	2
Start-up Boilers Foundations and Connections	2
Generator Step-up Transformer Foundation and Connections	2
Unit Auxiliary Transformer Foundation and Connections	2
Station Service Transformer Foundation and Connections	6
Surface Condenser Foundation and Connections	2
Cooling Tower Chemical Feed/Storage Area Structure, Foundation and Connections	2
Cooling Tower Electrical Enclosure Structure, Foundation and Connections	2
Cooling Tower Structure, Foundation and Connections	2
Raw/Fire Tank Structure, Foundation and Connections	2
Demineralized Water Tank and Pump Skid Structure, Foundation and Connections	2
Control Room/Warehouse Building Structure, Foundation and Connections	2
Water Treatment Area Structure, Foundation and Connections	2
Deaerator/Storage Tank Structure, Foundation and Connections	2
Feedwater Heaters Foundation and Connections	2
Gland Steam Condenser Foundation and Connections	2
Economizers Foundation and Connections	10
Re-heaters Foundation and Connections	8
Evaporators Foundation and Connections	8
Superheaters Foundation and Connections	4
Expansion Tanks Structure, Foundation and Connections	2 Lots
Blowdown Tanks Structure, Foundation and Connections	2
Auxiliary Boiler Foundation and Connections	2
Generator Circuit Breaker Foundation and Connections	2
Main Electrical Enclosure Structure, Foundation and Connections	2
Ullage System Area Foundation and Connections	2
Waste Water Tank Structure, Foundation and Connections	2
Closed Cooling Water Heat Exchanger Foundation and Connections	4
Fire Pump House Structure, Foundation and Connections	2
Fire Protection Sprinkler House Structure, Foundation and Connections	6
Start Diesel Generator Foundation and Connections	2
Above Ground Diesel Fuel Storage Tank Structure, Foundation and Connections	2
Excitation Transformer Foundation and Connections	2
Turbine Area Flash Tank Structure, Foundation and Connections	2
Lube Oil and EHC Skid Structure, Foundation and Connections	2
Oil/Water Separator Foundation and Connections	2
Closed Cooling Water Expansion Tank Structure, Foundation and Connections	2

Equipment/System	Quantity (Plant)
Nitrogen Bulk Storage and Vaporizer Structure, Foundation and Connections	2
Emergency Diesel Generator Foundation and Connections	2
Pipe Racks	1 Lot
Pumps Skid Structure, Foundation and Connections	1 Lot
Solar Field Reflectors and Receivers Foundations and Connections	1 Lot
Drainage Systems (including sanitary drain and waste)	1 Lot
High Pressure and Large Diameter Piping and Pipe Racks	1 Lot
HVAC and Refrigeration Systems	1 Lot
Temperature Control and Ventilation Systems (including water and sewer connections)	1 Lot
Building Energy Conservation Systems	1 Lot
Substation, Switchboards, Transformers, Buses and Towers	1 Lot
Electrical Cables/Duct Banks	1 Lot
Prefabricated Assemblies	1 Lot

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the 2007 CBC, adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, or a structural or civil engineer, as the resident engineer (RE) in charge of the project. All transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the conditions of certification in the **Transmission System Engineering** section of this document.

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The RE shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;

2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;

3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;

4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;

5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and

6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The resident engineer (or his delegate) must be located at the project site, or be available at the project site within a reasonable period of time, during any hours in which construction takes place.

The RE shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within five days of the approval.

If the RE or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has five days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the

project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731 and 6736 require state registration to practice as a civil engineer or structural engineer in California). All transmission facilities (lines, switchyards, switching stations, and substations) are handled in the conditions of certification in the **Transmission System Engineering** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project.

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and

3. Provide consultation to the RE during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

1. Review all the engineering geology reports;

2. Prepare the foundation investigations, geotechnical, or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement or collapse when saturated under load;

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2007 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both); and

4. Recommend field changes to the civil engineer and RE.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations.

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare a final soils grading report; and

2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 2007 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

1. Be directly responsible for the design of the proposed structures and equipment supports;

2. Provide consultation to the RE during design and construction of the project;

3. Monitor construction progress to ensure compliance with engineering LORS;

4. Evaluate and recommend necessary changes in design; and

5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in the Energy Commission's decision.

F. The electrical engineer shall:

1. Be responsible for the electrical design of the project; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer and engineering geologist assigned to the project.

At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, including prefabricated assemblies, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 2007 CBC. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Inspect the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM for corrective action; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions. The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at another accessible location during the operating life of the project. Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by the CPM.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" (Adobe pdf 6.0) files, with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;
2. An erosion and sedimentation control plan;
3. Related calculations and specifications, signed and stamped by the responsible civil engineer; and
4. Soils, geotechnical, or foundation investigations reports required by the 2007 CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area.

Verification: The project owner shall notify the CPM within 24 hours, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the 2007 CBC. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a non-conformance report (NCR), and the proposed corrective action for review and approval. Within five days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs, for the reporting month, shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans.

Verification: Within 30 days (or project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes, along with a copy of the transmittal letter to the CPM. The project owner shall submit a copy of the CBO's approval to the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction of any major structure or component listed in **Facility Design Table 2** of condition of certification **GEN-2**, above, the project owner shall submit to the CBO for design review and approval the proposed lateral force procedures for project structures and the applicable designs, plans and drawings for project structures. Proposed lateral force procedures, designs, plans and drawings shall be those for the following items (from **Table 2**, above):

1. Major project structures;

2. Major foundations, equipment supports, and anchorage; and

3. Large field-fabricated tanks.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component.

The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for example, highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications;

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation;

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer; and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS.

Verification: At least 60 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component listed in **Facility Design Table 2** of condition of certification **GEN-2**, above, the project owner shall submit to the CBO the above final design plans, specifications and calculations, with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder

qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the 2007 CBC.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 2007 CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2007 CBC shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in **Facility Design Table 2**, condition of certification **GEN-2**, above. Physical layout drawings and drawings not related to code compliance and life safety need not be submitted. The submittal shall

also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction.

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations and industry standards, which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- Riverside County codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in **Facility Design Table 2**, condition of certification **GEN-2,** above, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal-OSHA inspection of that installation.

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal-OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC) or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with the applicable LORS.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 480 Volts or higher (see a representative list, below), with the exception of underground duct work and any physical layout

drawings and drawings not related to code compliance and life safety, the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations. Upon approval, the above listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A. Final plant design plans shall include:

1. one-line diagrams for the 13.8 kV, 4.16 kV and 480 V systems; and

2. system grounding drawings.

B. Final plant calculations must establish:

1. short-circuit ratings of plant equipment;

2. ampacity of feeder cables;

3. voltage drop in feeder cables;

4. system grounding requirements;

5. coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8 kV, 4.16 kV and 480 V systems;

6. system grounding requirements; and

7. lighting energy calculations.

C. The following activities shall be reported to the CPM in the monthly compliance report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

D.1.13 CONCLUSIONS

1. The laws, ordinances, regulations and standards (LORS) identified in the Genesis Solar Energy Project (GSEP) AFC and supporting documents directly apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that GSEP is designed and constructed in accordance with applicable engineering LORS. This will be accomplished through design review, plan checking, and field inspections that will be performed by the CBO or other Energy Commission delegate. Staff will audit the CBO to ensure satisfactory performance.

4. Though future conditions that could affect decommissioning are largely unknown at this time, it can reasonably be concluded that if, the project owner submits a decommissioning plan as required in the **General Conditions** portion of this document prior to decommissioning, decommissioning procedures will comply with all applicable engineering LORS.

Energy Commission staff recommends that:

1. The proposed conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS;

2. The project be designed and built to the 2007 CBSC (or successor standards, if in effect when initial project engineering designs are submitted for review); and

3. The CBO reviews the final designs, checks plans, and performs field inspections during construction. Energy Commission staff shall audit and monitor the CBO to ensure satisfactory performance.

D.1.14 REFERENCES

GSEP 2009a – Genesis Solar Energy Project/T. Bernhardt (tn: 53083). Application for Certification for the Genesis Solar Energy Project. 08/31/2009

D.2 – GEOLOGY, PALEONTOLOGY, AND MINERALS

Testimony of Dal Hunter, Ph.D. CEG.

D.2.1 SUMMARY OF CONCLUSIONS

The proposed Genesis Solar Energy Project site is located in a moderately active geological area of the eastern Mojave Desert geomorphic province in eastern Riverside County in southeastern California. Because of its geological setting, the site could be subject to moderate levels of earthquake-related ground shaking. The preliminary geotechnical and geological hazards investigation also indicates a potential for expansive soils and hydrocompaction (GSEP 2009a). The effects of ground shaking would need to be mitigated through structural designs required by the California Building Code (CBC 2007) and a site-specific, design-level 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 site-specific, design-level geotechnical investigation would also present standard engineering design recommendations for mitigation of site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Genesis Solar Energy Project site. Locally, paleontological resources have been documented within lacustrine sediments in Ford Dry Lake, and regionally in older Quaternary alluvium. Older alluvium and lacustrine deposits may underlie younger Quaternary alluvium at an undetermined depth beneath 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, the California Energy Commission (Energy Commission) staff believes that the potential is low for significant adverse impacts to the proposed project from geological hazards during its design life and to potential geological, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's opinion that the proposed GSEP facility 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. Conditions of certification referred to herein serve the purpose of the Energy Commission's Conditions of Certification for purposes of the California Environmental Quality Act's Mitigation Measures.

D.2.2 INTRODUCTION

The Energy Commission staff (hereafter referred to as staff), in this section, discuss the potential impacts of geological hazards on the proposed Genesis Solar Energy Project (GSEP) site as well as the project's potential impacts on geological, mineralogical, and paleontological resources. Staff's objective is to ensure that there will be no consequential adverse impacts to significant geological and paleontological resources during the project construction, operation, and closure and that operation of the plant will not expose occupants to high-probability geological hazards. A brief geological and paleontological overview is provided. The section concludes with staff's proposed

monitoring and mitigation measures for geological hazards and geological, mineralogical, and paleontological resources, with proposed conditions of certification.

D.2.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The Energy Commission conducts environmental review of proposed projects under a California Environmental Quality Act (CEQA) process. 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?

Staff reviewed existing paleontological information and requested records searches from the Natural History Museum of Los Angeles County (NHMLA) and the University

of California Museum of Paleontology at Berkeley (UCMP) for the site area. Site-specific information generated by the applicant for the proposed GSEP 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 California Environmental Quality Act, 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 (PYFC) system. This system includes 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]). The PYFC class ranges from Class 5 (very high) to Class 1 (very low) (USDI 2007).

The proposed conditions of certification allow 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 geological, mineralogical, 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 geological, mineralogical, and paleontological resources from the proposed project is low.

D.2.3.1 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Applicable laws, ordinances, regulations, and standards (LORS) are listed in the application for certification (AFC) (GSEP 2009a). The following briefly describes the current LORS for both geological 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 United States Code [USC], 431-433)	The proposed GSEP facility site is located entirely on land currently administered by the Bureau of Land Management (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 National Park Service (NPS), the BLM, the Forest Service (USFS), and other Federal agencies.
National Environmental Policy Act (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'.
Federal Land Policy and Management Act (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.
National Historic Preservation Act of 1966 (NHPA) (16 USC 470)	Establishes policies for the 'preservation of the prehistoric and historic resources of the United States', under the direction of the Secretary of the Interior and the BLM.
State	
California Building Code (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 (APEFZ) 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 for Vertebrate Paleontology, indicated below.
California Environmental Quality Act (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.
Society for Vertebrate Paleontology (SVP), 1995	The "Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures" is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. The measures were adopted in October 1995 by the SVP, a national organization of professional scientists.
Local	
Riverside County General Plan, Safety Element	Adopts the Uniform Building Code (UBC) (1997), which provides design criteria for buildings and excavations. The UBC is superseded by the CBC (2007). Requires mitigation measures for geological hazards, including seismic shaking, surface rupture (adopts APEFZ Act), liquefaction, unstable soils and slopes, and flooding.
Riverside County General Plan, Multipurpose Open Space Element	Provides for 'preservation of cultural, historical, archaeological, paleontological, geological and educational resources'. Also provides a map showing paleontological sensitivity in the county.

D.2.4 PROPOSED PROJECT

D.2.4.1 SETTING AND EXISTING CONDITIONS

Applicant has applied for a right-of-way (ROW) grant for approximately 4,640 acres (7¼ square miles) currently administered by the BLM (GSEP 2009a). The property is divided into two elongate, roughly rectangular, unconnected portions along the northeast side of Chuckwalla Valley. The proposed GSEP would be constructed on approximately 1,800 acres (2¾ square miles) of the eastern portion, which is located north of Interstate Highway 10 and Ford Dry Lake roughly 23 miles west-southwest of the town of Genesis in Riverside County, California. An additional 90 acres will be utilized for off-site linear

construction. Future power-generating facilities are presumably planned for construction on the western portion of the property, which is included in staff's current assessment.

The proposed GSEP would be a primary concentrated solar electric power generating facility capable of producing 250 megawatts (MW) of electricity from two independent plants (GSEP 2009a). Each plant will employ parabolic trough solar thermal technology, which utilizes an array of mirrors that focus solar energy towards a centralized power block. The power block contains a heat transfer fluid (HTF) which supplies heat to solar steam generators (SSG) that drive steam turbine generators (STG). Water for the project would be provided from ground water supply wells.

The water would be treated to potable standards by an onsite packaged water treatment system, cooling water blow down would be disposed of by evaporation from lined ponds, and an on-site sanitary septic system would treat sewer waste water. On-site facilities associated with the solar plant would include control, warehouse and administration buildings, a bioremediation land treatment unit, raw, treated and deionized water storage tanks, HTF surge tanks, back-up diesel generators, cooling towers, and natural gas-fired auxiliary boilers. An access road, buried natural gas pipe line, and new 230 kilovolt (kV) electrical transmission line would occupy a 6.5-mile corridor extending from the southeast end of the GSEP site to Interstate 10. The generated electrical power from the Project switchyard will be transmitted through a generation-tie (gen-tie) line that will be routed in a southeasterly ROW eventually connecting to the proposed Southern California Edison (SoCal Edison) 500-230 kV Colorado River substation via the Blythe Energy Project Transmission Line (BEPTL)

Depending on the published reference, the proposed GSEP site is located in either the southeastern portion of the Mojave Desert geomorphic province (CGS 2002a), or the northeastern quarter of the Colorado Desert geomorphic province (Norris and Webb 1990), in the Mojave Desert of Southern California near the Arizona border. The region is more characteristic of the Mojave Desert geomorphic province in terms of geology, structure and physiography.

The Mojave Desert is a broad interior region of isolated mountain ranges which separate vast expanses of desert plains and interior drainage basins. The physiographic province is wedge-shaped, and separated from the Sierra Nevada and Basin and Range geomorphic provinces by the northeast-striking Garlock Fault on the northwest

side. The northwest-striking San Andreas fault defines the southwestern boundary, beyond which lie the Transverse Ranges and Colorado Desert geomorphic provinces. The topography and structural fabric in the Mojave Desert is predominately southeast to northwest, and is associated with faulting oriented similar to the San Andreas Fault. A secondary east to west orientation correlates with structural trends in the Transverse Ranges geomorphic province.

The proposed GSEP facility would be constructed on 1,800 acres (roughly 2¾ square miles) of land north of Interstate 10. The proposed site is located approximately 23 miles west-northwest of the town of Blythe, California, and about 24 miles east-southeast of the town of Desert Center in Riverside County, California. The proposed GSEP site would be situated on a broad alluvial plain within the northwest-trending

Chuckwalla Valley between the McCoy Mountains to the northeast, the Palen Mountains to the northwest, and Ford Dry Lake to the south. Overall the proposed site slopes at very shallow grades south and southwest toward the local topographic low at Ford Dry Lake. Quaternary age alluvial, lacustrine and eolian sedimentary deposits are mapped in the vicinity of the proposed GSEP site (CDMG 1967; USGS 1989; USGS 1990; USGS 2006; GSEP 2009a, c and f). Marine and transitional sediments of the Pliocene Age Bouse Formation are presumed to underlie alluvial fan deposits (USGS 1968; GSEP 2009a, c and f), and metasedimentary bedrock of the McCoy Mountains Formation outcrop in the McCoy and Palen Mountains (Harding and Coney 1985). The local stratigraphy as interpreted by numerous authors, is presented in **Geology and Paleontology Table 2**.

Geology and Paleontology Table 2
Correlation and Ages of Stratigraphic Units

Age	**Unit/Description**	**Jennings (CDMG 1967)**	**Stone and Pelka (USGS 1989)**	**Stone (USGS 1990)**	**Stone (USGS 2006)**	**Worley Parsons (GSEP 2009f)**
Holocene	Eolian sands	Qs	Qs	Qs	Qs	Qyma
	Younger alluvium	Qal	Qya	QTa	Qa_6*	Qyva Qyaf Qiaf**
	Playa lake deposits	Ql	Qp	Qp	Qp	Qp
Pleistocene	Older alluvium	Qc	Qia Qoa	QTa	Qa_3	Qoaf
Pliocene ± Miocene	Bouse Formation	Pu	Not Mapped	Tbs/Tbt	Tbs, Tbt	Not Mapped
Cretaceous	McCoy Mountains Formation	ms	Km*(x)*, KJm*(x)*	Kjmlu, Km*(x)*	Km*(x)*	Not Mapped

* - Interpreted as mid-Holocene in age based on suggested age of ancient shoreline, and moderate development of desert varnish and pavement
** - Transitional between older, dissected alluvial fan deposits and younger sediments in a depositional setting

Holocene units, which include eolian sands, younger alluvium, and playa lake deposits, are mapped over nearly the entire proposed GSEP site surface. Eolian sands consist of unconsolidated deposits of well sorted, wind blown sand in dunes and sheets. Younger alluvium is composed of sand, pebbly sand and sandy pebble-gravel, and is generally coarser grained closer to mountain ranges. Desert varnish is not well developed in the mostly unconsolidated and undissected sediments. Playa lake deposits are also unconsolidated, and are comprised of clay, silt and sand. Older alluvium is present at the surface along the northern edge of both the western (entire length) and eastern (west end only) portion and the proposed GSEP site. The exposures of older alluvium occur as north-south oriented ridges of material protruding into the site from the north, with the intervening areas occupied by drainages filled with younger alluvium. Older

alluvium is composed of consolidated gravel and sand that is moderately dissected with moderately developed desert pavement and varnish.

The approximate transition from Pleistocene to Holocene age sediments is marked by the change from older alluvium with an erosional, dissected surface, to a setting in which neither deposition nor erosion is occurring (intermediate alluvium), to areas undergoing active fan deposition (younger alluvium) (GSEP 2009f). A prominent east-west-trending linear feature observed on aerial photos that roughly corresponds to this transitional area is interpreted to be an ancient shoreline. Although the age of the shoreline is not well established, it is postulated in the Geological Resources and Hazards section of the AFC (GSEP 2009a) that the pluvial highstand of Ford Lake could have occurred approximately 4000 years before present (bp). This suggests a Holocene age of deposition for intermediate alluvium (Qiaf, Unknown Reference, GSEP 2009a), which is shown in areas mapped as younger alluvium by others (Qal , CDMG 1967; Qva, USGS 1989; and Qa_6, USGS 2006).

Interbedded clay, silt, sand, limestone and tufa of the Bouse Formation were deposited in a marine to brackish-water environment during the Pliocene epoch in Coachella Valley (USGS 1968; USGS 2006). The sediments were deposited in a marine embayment of the Gulf of California that encroached northward into the Colorado River valley during the late Tertiary. The nearest exposure relative to the proposed GSEP site is mapped at the north end of the Mule Mountains approximately 8 miles southeast of the southeastern end of the project linears (USGS 1968). The geotechnical investigation attached to the AFC indicates that the unit underlies the proposed site at a depth of 245 to 275 feet beneath Quaternary alluvium, and extends several thousand feet (GSEP 2009a). Weakly metamorphosed sandstone and conglomerate, and lesser shale, mudstone and siltstone, of the Cretaceous age McCoy Mountains Formation are the predominant lithologies in the McCoy and Palen Mountains (CDMG 1967; USGS 1968; USGS 1990; USGS 2006). The nearest exposures are located roughly 2½ miles north of the western portion of the property in the Palen Mountains and 3 miles northeast of the project linears in the McCoy Mountains.

One reverse circulation drill hole was advanced to a depth of 900 feet for the preliminary geotechnical investigation attached to the AFC (GSEP 2009f). The drill hole was located at the east end of the western portion of the GSEP site, approximately 1.5 miles from the western limit of proposed construction on the eastern portion of the site. The upper 12 feet of the drill hole consisted of gravelly sand with silt that contained 16 to 17 percent fines passing the number 200 sieve. Between 12 and 75 feet (limit of presented data), the soils consisted of interbedded silty sand, clayey sand, sandy lean clay and fat clays interpreted to have been deposited in alternating alluvial and lacustrine environments. Penetration resistance blow counts, obtained by driving a Modified California split spoon sampler at regular intervals in the upper 75 feet of the drill hole, indicate the consistency of the site soils are very dense or very hard (GSEP 2009f). A summary of laboratory testing in the preliminary geotechnical investigation reported plasticity indices for the clay soils that range from 23 to 39, and free swells ranging from 130 to 270 percent (GSEP 2009f). The test results indicate the clay soils are moderately to highly expansive. The upper 12 feet of granular materials is considered to be younger alluvium, and underlying granular and clay soils are interpreted to be older alluvial fan and lacustrine deposits (GSEP 2009f). The depth to older alluvium beneath younger

alluvium across the portion of the GSEP site proposed for construction, however, is unknown and likely varies greatly. Shallow excavations encountered weakly carbonate-cemented sediments and soil development, which could be intermediate or older alluvium, at depths just beneath 18 inches below the surface (GSEP 2009f). This suggests that only a thin veneer of younger alluvium may be present locally, or in large areas, across the proposed site.

Geophysical testing, which included seismic refraction, electromagnetic soundings, and surface and down hole shear wave velocity profiles, were also conducted in the vicinity of proposed construction. Depth to ground water and the top of the Bouse Formation, relative density of the alluvial soils, and the project location site class (CBC 2007), were estimated using geophysical methods.

The proposed GSEP plant site is not crossed by any known active faults or designated Alquist-Priolo Earthquake Fault Zone (EFZ, formerly called Special Studies Zones) (CGS 2002b). A number of major, active faults lie within 62 miles of the site. These faults are discussed in detail under the **Geological Hazards** section later in this section. Several northwest-striking, south-dipping basement thrust faults are mapped at the extreme south ends of the Palen and McCoy Mountains, and are inferred beneath Quaternary and Tertiary sediments in Chuckwalla Valley (Harding and Coney 1985; CDMG 1967; USGS 1990; USGS 2006). The faults are part of a major Mesozoic terrain-bounding structural zone that was active during late Jurassic time, and are associated with folding and metamorphism of the McCoy Mountains Formation. The basement faults are no longer active, and are not exposed anywhere on the surface of the proposed site.

The site-specific geotechnical investigation performed for the proposed GSEP (GSEP 2009a) estimated a depth to the ground water table of 61 to 81 feet below the surface in the vicinity of proposed construction, based on geophysical methods. Ground water was encountered at approximately 77 feet below ground surface (bgs) in the reverse circulation drill hole 1.5 miles west of proposed construction. Water level monitoring at wells 006S019E28R001S, 006S019E32K001S, and 006S019E32K002S, located 1½ to 4½ miles southwest of the eastern portion of the proposed site near Ford Dry Lake, yielded water levels of 81 to 110 bgs feet from 1992 to 2000 (CDWR 2009; USGS 2009). Measured ground water levels at the southeast end of the proposed project linears ranged from 125 to 151 feet bgs between 1979 and 2002 in wells 006S020E33C001S, 006S020E33L001S, and 007S04E33R001S. Water levels beneath the site would vary seasonally and with pumping frequency of nearby irrigation wells.

Existing grade at the proposed power plant site slopes between 0.5 and 1.5 percent to the south and southwest towards Ford Dry Lake. Site drainage is probably by a combination of infiltration, overland sheet flow and shallow drainages. A more complete discussion of on-site drainage is included in the **Water Resources** section of this staff assessment

D.2.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section considers two types of impacts. 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 geological, mineralogical, and paleontological resources in the area.

D.2.4.2.1 Direct/Indirect Impacts and Mitigation

Ground shaking, expansive soils, and hydrocompaction represent the main geological hazards at the proposed site. These potential hazards could be effectively mitigated through facility design by incorporating recommendations contained in the project geotechnical evaluation. Proposed Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section should also mitigate these impacts to a less than significant level.

The proposed GSEP site is located within Mineral Resource Zone 4 (MRZ-4), which denotes “areas of no known mineral occurrences where geological information does not rule out either the presence or absence of significant mineral resources” (CDMG 1994a). No economically viable mineral deposits are known to be present at the site (CDMG 1994a; Kohler 2006). Many inactive mines and mineral prospects are hosted by in metamorphic and intrusive basement rocks within 10 miles of the proposed project boundaries and project linears. These have produced a number of precious and base metals, including iron (magnetite) from the Iron King, Iron Queen and Iron Cap mines in the Palen Mountains1½ to the north (CDMG 1994a). Minor gold, silver, copper and uranium prospects are located in the Palen Mountains 2½ miles to the north, and in the McCoy Mountains 4½ miles to the east. The Roosevelt and Hodge Mining Districts produced gold and silver from quartz veins and shear zones in the Mule Mountains approximately 6 to 9 miles southeast of the proposed project linears. Pyrophyllite, an industrial mineral used in the manufacturing of dry lubricants, paper, rubber, fabric and soap, has been mined from the Palen Mountains 3½ miles north of the site. Several borrow pits are present along Interstate 10. No mines are known to have existed within the proposed project boundaries (USGS 2008b).

Near-surface geology beneath the proposed GSEP site consists primarily of Quaternary alluvium, eolian and lacustrine sediments which increases in age with depth from Holocene at the surface to Pleistocene and older at depth (CDMG 1967;USGS 1989; USGS 1990; USGS 2006). Coarse-grained sediments grade laterally and are likely interbedded with lakebed deposits of similar ages to the south and southwest towards Ford Dry Lake. Pleistocene age older alluvium, which is exposed along the northern boundary of the site, underlies younger alluvium and lacustrine sediments. Pleistocene age deposits may be within a few feet of the surface along the northern border, and at an unknown but progressively deeper depth to the south across the proposed site and project linears. Pliocene age marine and transitional sediments of the Bouse Formation underlie Quaternary deposits at depths of 245 to 275 feet, but are not exposed at the surface (GSEP 2009a). Similarly, metamorphosed sediments of the Cretaceous age McCoy Mountains Formation make up nearly all basement rocks in the McCoy and Palen Mountains (CDMG 1967; USGS 1968; USGS 1990; USGS 2006), but are not present on the proposed site.

Staff reviewed correspondence from the NHMLA (McLeod, 2009), the UCMP, and the Riverside County Land Information System (RCLIA 2009), for information regarding known fossil localities and stratigraphic unit sensitivity within the proposed project area. The paleontological resources section of the AFC (GSEP 2009a) indicates there are no recorded fossil collection sites within the proposed project boundaries based on reports submitted by the NHMLA or the UCMP. The only known fossil remains on the proposed site and project linears were observed during a four-day field survey. Fragments of tortoise carapace and bones, which were partly replaced with calcite, gypsum and opaline silica, were found in stream beds. The fragmental condition indicates the specimens were transported a significant distance to their current location, probably post-mortem, and the mineralization suggests an age on the order of several thousand years (GSEP 2009a). Microfossils, including diatoms and ostracods, were also found in sediments during a preliminary field survey. The paleontological assessment report concludes that fossils observed on the proposed site are indicative of late Pleistocene/early Holocene environment, and that there is only limited potential for the observed specimens to add to the current body of scientific knowledge. It should be noted that "*a complete pedestrian survey of the entire Project area of potential effect for paleontological resources was considered unnecessary and no subsurface exploration was conducted. A more detailed survey was considered unnecessary because the Project site is located in a lowland, depositional environment consisting of the surface of very recent Holocene alluvium*" (GSEP 2009a).

Several fossil localities have been documented by the NHMLC in the local region in geological units that may be encountered during construction of the proposed GESP site (McLeod 2009). The nearest is a pocket mouse specimen recovered from lacustrine sediments in the southwest part of the Ford Dry Lake, within roughly 4 miles southwest of proposed construction. A site in older alluvium approximately 20 to 25 miles to the northwest has produced fossil remains of tortoise, horse and two species of camel.

Based on the recorded fossil finds, staff concludes the paleontological resource sensitivity of Quaternary age sediments varies from low in Holocene age younger alluviual, lacustrine and eolian deposits at shallow depths to high as Pleistocene age older alluvium and lacustrine deposits are encountered at deeper depths. The depth to Pleistocene age sediments is unknown and may vary significantly across the site. Older alluvium is mapped at the surface along the northern border of the site, and would likely be buried at progressively deeper depths beneath Holocene sediments southward across the site. The geomorphic reconnaissance report for the proposed project encountered a weathered horizon that may be older alluvium within only two or three feet of the surface beneath younger alluvium (GSEP 2009f). McLeod (2009) indicated that older lacustrine deposits may be encountered in excavations along the southwest margins of the site nearest Ford Dry Lake.

The Riverside County Transportation and Land Management Agency (TLMA) has produced a paleontological sensitivity map of the county (RCLIS 2009). The mapping indicates that areas underlain by playa lake, eolian and younger alluvial deposits within and around the Ford Dry Lake basin have a high paleontological sensitivity rating. Younger alluvium upslope from the lakebed has a low sensitivity rating, and older alluvium is assigned an undetermined sensitivity rating, according to the TLMA.

Staff concludes that all subsurface older Quaternary age alluvial and lacustrine sediments are highly sensitive. Where these units are mapped at the surface or may be present near the surface adjacent to these mapped areas, specifically along the northern and southern (adjacent to Ford Dry Lake) borders of the proposed GESP site, paleontological monitoring should be conducted for any excavation from the surface. Since the depth to Pleistocene age alluvial and lacustrine deposits is undetermined at present for the remainder of the site, any excavations that penetrate below 1.5 feet of the existing ground surface should be treated as having a high potential for impacting significant paleontological resources and would require paleontological monitoring. This depth is based on observations of possible older alluvium encountered in excavations advanced for the geomorphic reconnaissance report (GSEP 2009f).

As monitoring of grading and trenching activities during proposed construction of the site progresses, a qualified professional paleontologist may determine a more appropriate depth above which the coarse and fine grained soils are Holocene in age, have a low sensitivity, and low potential for adverse impacts on paleontological resources. This depth would likely increase from the northern and southern boundaries towards the center of the proposed GESP site. Recommendations for increased, decreased, or unchanged levels of monitoring could be proposed as well based on increased information and experience gained as proposed construction progresses.

The Pliocene age Bouse Formation is known to have produced fossil specimens in the Colorado River Valley area (USGS 1968). However, the unit is not exposed at the surface of the proposed site, and a minimum depth of 245 feet bgs was determined in the project geotechnical investigation (GSEP 2009a). Similarly, bedrock present in the McCoy Mountains Formation is expected to lie at even greater depths beneath the site, and metamorphic rocks are generally considered to have little or no potential for containing significant fossil remains. Therefore, staff considers the potential for impacting significant paleontological resources in the Bouse and McCoy Mountains Formations during proposed construction to be minimal.

Staff considers the probability for significant paleontological resources to be encountered during proposed site construction activities to be low in Holocene age deposits on most of the proposed GSEP site surface. However, proposed mass grading, deep foundation excavation and utility trenching may penetrate underlying Pleistocene age soils at undetermined depths, particularly in the northern portions of the site. Overall, the potential for exposure of paleontological resources would be considered as high, until determined otherwise by a qualified professional paleontologist. Low and high paleontological sensitivity roughly corresponds to PYFC Condition 3, Class 1 or 2 and Condition 2, Class 4a and 4b, respectively.

This assessment is based on SVP (1995) criteria and the paleontological report appended to the AFC (GSEP 2009a). 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, or PRS).

The proposed conditions of certification allow the BLM Authorized Office and the Energy Commission's CPM and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geological hazards and the protection of geological, mineralogical, 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 geological hazards, and to potential geological, mineralogical, and paleontological resources, from the proposed project, is low.

Geological Hazards

The AFC provides documentation of potential geological hazards at the proposed GSEP plant site, including some site-specific subsurface information (GSEP 2009a). Review of the AFC, coupled with staff's independent research, indicates that the potential for geological hazards to impact the proposed plant site during its practical design life would be low if recommendations for mitigation of seismic shaking, expansive soils, and hydrocompaction are followed. Geological hazards should be addressed in a project-specific, design-level geotechnical report per CBC (2007) requirements (GSEP 2009a).

Staff's independent research included the review of available geological maps, reports, and related data of the proposed GSEP plant site. Geological information was available from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG, now know as CGS), the U.S. Geological Survey (USGS), the American Geophysical Union, the Geological Society of America, the Southern California Earthquake Data Center (SCEDC), and other organizations.

Faulting and Seismicity

Energy Commission staff reviewed numerous CGS, CDMG and USGS publications as well as informational websites in order to gather data on the location, recency, and type of faulting in the proposed project area. Type A and B faults within 63 miles (100 kilometers) of the proposed GSEP site are listed in **Geology and Paleontology Table 3**. 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 3**. Because of the large size of the proposed site the distances to faults are measured from a point between the two proposed power blocks within the site.

Geology and Paleontology Table 3
Active Faults Relative to the Proposed Genesis Solar Energy Project Site

Fault Name	Distance from Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Fault Type and Strike	Fault Class
Brawkey Seismic Zone	47.5	6.4	0.058	Right-Lateral Strike Slip (Northwest)	A
San Andreas: Coachella	47.6	7.2	0.089	Right-Lateral Strike Slip (Northwest)	A
San Andreas: Whole	47.6	8.0	0.136	Right-Lateral Strike Slip (Northwest)	A
Elmore Ranch	49.6	6.6	0.063	Left-Lateral Strike Slip (Northeast)	B
Pinto Mountain	61.8	7.2	0.073	Left-Lateral Strike Slip (East-West)	B
Imperial	62.9	7.0	0.064	Right-Lateral Strike Slip (Northwest)	A

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.

Six Type A and B faults and fault segments were identified within 63 miles of the proposed GSEP site (**Geology and Paleontology Table 3).** Of these, none are within 45 miles of the site. Four of the faults are Type A right-lateral, northwest-trending strike-slip fault systems that are subparallel to the San Andreas Fault System. The remaining two faults are Type B, are east-west to northeast striking, and are left-lateral strike-slip faults with characteristics similar to the Garlock Fault, which bounds the northwestern side of the Mojave Desert geomorphic province (CGS 2002a). All fault zones in **Geology and Paleontology Table 3** lie within designated Alquist-Priolo Earthquake Fault Zones (CDMG 2003)

The proposed GSEP site is located just southwest of the Mojave-Sonoran Belt a roughly 60-mile-wide structural belt that has been correlated with the southern extension of the Walker Lane Fault Zone (USGS 1991). The western boundary for the structural zone, located 5 to10 miles northeast of the proposed site, is marked by an abrupt termination of north- and northeast-trending mountain ranges and basins to the east that are characteristic of the San Andreas Fault Zone, and northwest-trending strike-slip faulting to the west. The Mojave-Sonoran Belt is notable for its relative lack of seismicity and recent faulting (USGS 1991). The region has experienced a low frequency of Pliocene faulting, and Pleistocene faults are nearly absent. These characteristics are unusual given its proximity to areas of intense faulting and frequent seismicity, such as the Eastern California Shear Zone (Dokka and Travis 1990) to the northwest and the Salton Trough to the west.

All of the faults listed in **Geology and Paleontology Table 3** could generate some level of ground shaking at this site. Since there are no known faults of any age through the site, the potential for actual seismic ground surface rupture is negligible.

The close proximity of the proposed GSEP site to the Mojave-Sonoran belt and relatively great distance from more seismically active areas to the west and northwest would suggest a relatively low to moderate probability of intense ground shaking in the project area. However, events such as the Landers earthquake (7.6 Mw), which

occurred on June 28, 1992 approximately 90 miles from the proposed site (Blake 2000b), demonstrate that the proposed site could be subject to moderate levels of earthquake-related ground shaking in the future. The effects of ground shaking would need to be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC 2007) and a site-specific project geotechnical report.

The estimated bedrock peak horizontal ground acceleration (Site Class B) for the power plant is 0.20 times the acceleration of gravity (0.20g) (USGS 2008a). Based on weight averaged down hole shear wave velocities of 1210 feet/sec, and supported by Modified California penetration resistance blow counts, the soils at the proposed GSEP site were determined to be Site Class C (CBC 2007; GSEP 2009f). Buildings and structures are required to be designed with adequate strength to resist the effects of Design Earthquake Ground Motion, as defined by the CBC (2007). This motion is calculated using the site classification, occupancy categories and site coefficients, which in turn are used to determine the design spectral response acceleration parameters at short and 1-second periods. These parameters are generally provided in the design-level geotechnical report for the specific project site.

The potential for strong ground shaking will be addressed in proposed Facility Design Condition of Certification **GEN-1**. Proper design in accordance with this condition, as well as with requirements presented in the site-specific, design-level geotechnical evaluation, should adequately mitigate seismic hazards to the current standards of practice.

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 geological strata at this depth are generally too compact to liquefy.

The preliminary geotechnical investigation at the proposed site estimated current depths to ground water determined by geophysical methods and supported by a single boring 1.5 miles west of proposed construction ranges from 61 to 81 feet bgs (GSEP 2009f). Ground water levels recorded in the nearest wells south of the site and in the vicinity of the southern end of the project linears range from 81 to 151 feet bgs (CDWR 2009; USGS 2009). The geotechnical report also indicated that the granular soils encountered in borings were generally very dense. Because the ground water table is greater than 40 feet deep across the property, and the shallow granular soils are very dense, the potential for liquefaction-induced settlement beneath the site during moderate seismic events is considered to be very low. Measures to mitigate significant damage due to liquefaction should be presented in a design-level, site-specific geotechnical report. Liquefaction potential on the proposed GSEP site is also addressed in the 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. 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 GSEP site is not subject to catastrophic liquefaction-induced settlement, the potential for lateral spreading during seismic events would be negligible due to the low relief and very shallow slopes at the proposed site surface. Lateral spreading potential on the proposed GSEP site should be addressed in a design-level project geotechnical report per CBC (2007).

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements. The preliminary geotechnical investigation indicates there would be a potential for minor and localized dynamic compaction during an earthquake (GSEP 2009f). The final geotechnical site evaluation should further investigate the potential for dynamic compaction within the proposed project site and along its linears and, if necessary, provide design parameters necessary to mitigate dynamic compaction issues.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. The initial site geotechnical investigation indicates that subsurface alluvial deposits which underlie the proposed project linears contain soils that may experience hydrocompaction (GSEP 2009f). The final geotechnical site evaluation should further investigate the potential for hydrocompaction within the proposed project site and along its linears and, if necessary, provide design parameters necessary to mitigate hydrocompaction issues.

Subsidence

The Riverside County General Plan indicates the basin fill sediments in Chuckwalla Valley are susceptible to subsidence (RCLIA 2008; GSEP 2009f). 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. However, even during the 1980’s and 1990’s when regional ground water extraction was at its historic maximum of approximately 48,000 acre-feet per year (AFY) no localized or regional subsidence was recorded. Current ground water withdrawals are reportedly only approximately 2,000 AFY and even the proposed project demand of an additional 1,600 AFY will not approach historic pumping demands. In addition, no petroleum or natural gas withdrawals are taking place in the proposed site vicinity. Therefore, the potential for local or regional ground subsidence resulting from petroleum, natural gas, or ground water extraction is considered to be very low.

Local subsidence or settlement may also occur when areas containing compressible soils are subjected to foundation or fill loads. The relative density of site granular soils was determined to be very dense based on available penetration resistance blow counts in the preliminary geotechnical investigation (GSEP 2009f). Very dense soils are unlikely to experience significant subsidence due to foundation loading.

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 preliminary geotechnical evaluation indicates near-surface soils at the proposed site are composed of granular soils with a low content of non-plastic fines, which are not considered to be expansive (GSEP 2009a). However, expansive clay soils were encountered at relatively shallow depths in the single boring located 1.5 miles west of proposed construction and could be present at shallow depths beneath the site. A site-specific, design-level geotechnical site investigation would further evaluate the presence of expansive soils within the proposed project site and along its linears and, if necessary, will provide routine design recommendations to mitigate expansive soil issues (GSEP 2009a).

Landslides

Due to the low site gradient and the absence of topographically high ground in the site vicinity, the potential for landslide impacts to the site is considered to be negligible.

Flooding

The proposed GSEP area has not been mapped by the Federal Emergency Management Agency for flood potential (FEMA 2009). Because the proposed site is topographically higher than Ford Dry Lake to the south, it is staff's opinion that the potential for flooding at the site is limited to infrequent high volume (flash flood) events which may occur due to heavy rainfall in the Palen and McCoy Mountains northeast and northwest of the site. Storm waters would be carried across the proposed site from roughly north to south via existing drainages. Site drainage would be modified during project construction to mitigate potential impacts due to catastrophic flooding (GSEP 2009a).

Tsunamis and Seiches

The proposed GSEP site and associated linear facilities are not located near any significant surface water bodies, and therefore the potential for impacts due to tsunamis and seiches is considered to be negligible.

Volcanic Hazards

The proposed GSEP site is located approximately 42 miles west of the Lavic Lake volcanic hazard area (VHA), an approximately 14 square mile area within the Mojave Desert comprised of Miocene to Holocene age dacitic to basaltic flows, pyroclastic rocks, and volcaniclastic sediments (Glazner et al. 2000). The Lavic Lake VHA has

been designated by the USGS as an area subject to lava flows and tephra deposits associated with basalt or basaltic andesite vents (Miller 1989). The Amboy Crater – Lavic Lake VHS is also considered to be subject to future formation of cinder cones, volcanic ash falls, and phreatic explosions. The recurrence interval for eruptions has not been determined, but is likely to be in the range of one thousand years or more. Because the proposed GSEP site is not located within a designated volcanic hazard area, staff considers the likelihood of significant impacts to the project resulting from volcanic activity would be low.

Geological, Mineralogical, and Paleontological Resources

Geological and Mineralogical Resources

Staff has reviewed applicable geological maps, reports, and on-line resources for this area (Blake 2000a and b; CDMG 1990; CDMG 1994a and b; CDMG 1998; CDMG 1999; CDMG 2003; CGS 2002a, b and c; CGS 2007; Jennings and Saucedo 2002; SCEDC 2008; USGS 2003; USGS 2008a and b). Staff did not identify any geological or mineralogical resources at the proposed GSEP facility location.

The proposed GSEP site is located within MRZ-4 and no economically viable mineral deposits are known to be present (CDMG 1994a; Kohler 2006). Numerous mines and mineral prospects, which have produced iron, gold, silver, copper, uranium, and pyropyllite, are present within 10 miles of the proposed project. No mines are known to have existed within the proposed project boundaries (USGS 2008b).

Paleontological Resources

Staff reviewed the Paleontological Resources Assessments in Section 5.9 and Appendix E of the AFC (GSEP 2009a). Staff has also reviewed paleontological literature and records searches conducted by the NHMLA (McLeod 2009) and the UCMP. These reports document several recorded fossil localities in Holocene to Pleistocene age alluvium and lakebed sediments on and within 25 miles of the proposed GSEP site. Based on these recorded fossil finds and the age of the sediments which may be encountered during construction, the paleontological resource sensitivity of undisturbed Quaternary alluvium and lacustrine sediments varies from low at shallow depths to high at deeper depths. The depth to Pleistocene age sediments beneath Holocene deposits is unknown for most of the proposed site. Staff concludes that all sedimentary units below a depth of 1.5 feet of the ground surface where Holocene age sediments are mapped should initially be treated as highly sensitive. Where Pleistocene age deposits are mapped along the northern and southern borders, staff considers the highly sensitive sedimentary units to be present at the surface. Highly sensitive roughly corresponds to PYFC Condition 2, Class 4a or 4b. After monitoring of grading and trenching activities during proposed construction of the site, a qualified professional paleontologist may determine the appropriate depth above which the coarse grained soils are Holocene in age, have a low sensitivity, and low potential for adverse impacts on paleontological resources (PYFC Condition 3, Class 1 or 2).

These conclusions are based on SVP criteria, the Paleontological Resource Assessments in the AFC (GSEP 2009a), and the independent records searches and paleontological review provided by McLeod (2009) and the UCMP. 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 would essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (a paleontological resource specialist, or PRS).

The proposed conditions of certification would 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 geological hazards and the protection of geological, mineralogical, and paleontological resources.

D.2.4.2.2 Construction Impacts and Mitigation

The design-level geotechnical evaluation, 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, expansive soils, and hydrocompaction (see **Proposed Conditions of Certification, Facility Design**).

As noted above, no viable geological or mineralogical resources are known to exist in the vicinity of the proposed GSEP site. Construction of the proposed project will include grading, foundation excavation, and utility trenching. Based on the soils profile, SVP assessment criteria, and recorded fossil localities within 25 miles of the proposed site, staff considers the probability of encountering paleontological resources to be negligible in the upper 1.5 feet of most of the site. Sediments at the surface along the northern and southern borders of the site, as well as all sediments below 1.5 feet of the remainder of the site, should be treated as highly sensitive (PYFC Condition 2, Class 4a, 4b).

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. Essentially, Conditions of Certification **PAL-1** to **PAL-7** would require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (paleontological resource specialist, or PRS). Earthwork would be 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 would yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist would be retained, for the 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 less 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. In the case of the GSEP site, the PRS would determine an appropriate depth above which undisturbed alluvial and

lacustrine sediments are Holocene in age, have a low paleontological sensitivity, and have little chance of containing significant fossils. The PRS could then recommend decreased monitoring for excavations above that depth. Paleontological sensitivity of Pleistocene age sediments below the determined depth would remain high and would require continued monitoring.

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

D.2.4.2.3 Operation Impacts and Mitigation

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

D.2.4.2.4 Project Closure and Decommissioning

The future decommissioning and closure of the project should not negatively affect geological, mineralogical, 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.

D.2.4.3 CEQA LEVEL OF SIGNIFICANCE

CEQA guidelines strive to assure projects on public lands will not:

- Block access to a geological or mineralogical resource, a source of industrial minerals, or construction aggregates.
- Damage, destroy or block access to a natural geological feature with aesthetic and/or scientific value.
- Damage, destroy, or block access to a significant paleontological resource (primarily but not always, vertebrate fossils).
- Increase or initiate regional ground subsidence through extraction of ground water, petroleum, or natural gas.
- Construct structures that would be dangerous to workers or the general public as the result of natural geological hazards of the site.

Independent research conducted by CEC staff geologists verifies that there are no known geological or mineralogical resources or unusual geological features near or within the boundary of the proposed GSEP site. The CEQA level of significant from these areas of concern is “no impact.” Since major ground water withdrawal is not anticipated and regional subsidence is not a known geological hazard in this area, staff concludes that ground water withdrawal for this project would result in an impact of “less than significant.”

All structures on this site must be constructed to the standards of the current California Building Code (CBC 2007), as specified in proposed Condition of Certification **GEN-1** under **Facility Design**. The building code standards are based on both theoretical design and observation of component failures over many years. The intent of the building code is to minimize the risk to human life from natural hazards, including those inherent in the geological environment (earthquake-related, landslides, tsunamis/seiches, volcanic eruptions) and those from other sources, primarily high wind loading. Implementation of these design standards, per **GEN-1**, should result in geological hazards being “less than significant with mitigation” (mitigation being proper design for the site-specific hazards).

Energy Commission staff concludes that the GSEP site is situated in a geological environmental with a high potential to encounter significant paleontological resources, particularly in deeper excavations required for the large structures. 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**.

D.2.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so impacts are reduced, and (2) by eliminating the eastern solar field, which is located on flowing desert washes, it would reduce impacts to the sand dune and playa areas and to the Mojave Fringe-toed Lizard habitat. The alternative would also reduce impacts to wildlife movement by reducing obstruction of the Palen wash and would maintain, thru both fluvial and Aeolian processes, the dune and sandy habitats. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

D.2.5.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

D.2.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Reduced acreage alternative proposes construction and operation of a 125 MW facility. The 125 MW facility under this Alternative would create no additional impacts and would lower the potential to encounter fossils by virtue of a reduced construction footprint.

D.2.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the Reduced Average 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.

D.2.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by the applicant (NextEra) for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in the **Alternatives** section of this document.

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

D.2.6.1 SETTING AND EXISTING CONDITIONS

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

D.2.6.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Because the ACC system would be located at the same location as the proposed cooling towers within the proposed GSEP site and would not require any additional grading, impacts to geological and paleontological resources from use of the ACC system are expected to be similar as with the proposed wet-cooling system. No additional ground disturbance would be required and as such, no additional disturbance to paleontological or geological resources would be expected. As with the wet-cooling towers, the ACC system would be subject to the 2007 California Building Code and would be required to incorporate the seismic design parameters appropriate for the GSEP site. Additionally, construction of the ACC system would be required to comply with all applicable LORS as for the proposed wet-cooling system and would incorporate similar mitigation as for the proposed wet-cooling system.

No localized or regional subsidence was recorded during the 1980's and 1990's, when regional ground water extraction was at its historic maximum of approximately 48,000 AFY. Current ground water withdrawals are reportedly only approximately 2,000 AFY and the reduced proposed project demand of 66 AFY (from 822 AFY) will not approach historic pumping demands. Therefore, the potential for local or regional ground subsidence resulting from additional ground water extraction is still considered to be very low.

D.2.6.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the dry cooling alternative from geological hazards during its design life and to potential geological, mineralogical, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's conclusion that the alternative use of ACCs in place of cooling towers 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. The CEQA level of significance would remain unchanged from the proposed project.

D.2.7 NO PROJECT/NO ACTION ALTERNATIVES

The No Project Alternative under CEQA would exist if the proposed Genesis Solar Energy Project were not constructed. The CEQA Guidelines state that "the purpose of describing and analyzing a 'no project' alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project" (Cal. Code Rags., tit. 14 § 15126.6(l)). The No Project analysis in this RSA considers existing conditions and "what would be reasonably expected to occur in the foreseeable future if the project were not approved…" (Cal. Code Rags, tit. 14 § 15126.6(e)(2)).

If the No Project/No Action Alternative were selected, the construction and operational impacts of the Genesis project would not occur. There would be no grading of the site, no loss of resources or disturbance of approximately 4,640 acres of desert habitat, no potential impacts to paleontological resources, and no installation of power generation and transmission equipment. The No Project/No Action Alternative would also eliminate contributions to cumulative impacts on a number of resources and environmental parameters in Riverside County and in the Mojave Desert and Colorado/Sonora Desert as a whole.

In the absence of the Genesis project, however, other power plants, both renewable and non-renewable, would have to be constructed to serve the demand for electricity and to meet RPS. If the No Project/No Action Alternative were chosen, other utility-scale solar power facilities may be built, and the impacts to the environment may be similar to those of the proposed project because these technologies require large amounts of land like that required for the Genesis project. The No Project/No Action Alternative may also lead to sitting of other non-solar renewable technologies to help achieve the California RPS.

Paleontological resources have been documented in the general area of the project. As the value of paleontological resources is predicated on their discovery within a specific geological host unit, construction of the project could 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. The No Project/No Action Alternative would preclude this potential net gain.

D.2.8 COMPARISON OF ALTERNATIVES AND PROPOSED PROJECT

Geology and Paleontology Table 4
Comparison of Proposed Project and Alternatives

Impact	Proposed Project (250 MW)	Reduced Acreage Alternative (125 MW)	Dry Cooling Alternative	No Project/No Action*
No. of Acres	1,800	900	1,800	0
Geological Hazards	Ground shaking – Less than significant with mitigation	Ground shaking – Less than significant with mitigation	Ground shaking – Less than significant with mitigation	Not Applicable (N/A)
Geological Resources	None identified – No impact	None identified – No impact	None identified – No impact	N/A
Mineralogical Resources	None identified – No impact	None identified – No impact	None identified – No impact	N/A
Paleontological Resources	High sensitivity – No impact with mitigation	High sensitivity – No impact with mitigation	High sensitivity – No impact with mitigation	N/A

D.2.9 CUMULATIVE IMPACTS

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 project area, as shown on **Cumulative Impacts Figure 3,** Plaster City 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 project. 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 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.

D.2.9.1 GEOGRAPHIC SCOPE OF ANALYSIS

The geographic area considered for cumulative impacts on geology and paleontology is the Chuckwalla Valley in the southeastern area of the Mojave Desert geomorphic province. 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 (relative to past, discontinued withdrawal rates) is not part of the proposed project.

D.2.9.2 EFFECTS OF PAST AND PRESENT PROJECTS

Any previously completed project involving subsurface excavation without the benefit of paleontological monitoring might 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 possibility of prior damage is real but modest and unavoidable, after the fact.

D.2.9.3 EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

D.2.9.3.1 Foreseeable Projects in the Project Area

A number of future foreseeable projects identified in **Cumulative Table 3 (Section B.3)** are located within the Chuckwalla Valley. Such projects could include ground water pumping of similar magnitude to the GSEP; however, the combined effect of these projects would still result in much less than the historic rate of 48,000 AFY, which did not cause any documented regional subsidence, such that significant impacts to regional subsidence would not be expected from the ground water pumping needed for the GSEP. Therefore, there would be no significant cumulative contribution to regional subsidence from foreseeable renewable projects in the Chuckwalla Valley.

D.2.9.3.2 Foreseeable Renewable Projects in the California Desert

As shown in **Section B.3, Cumulative Scenario Table 1A**, the El Centro office of the BLM is aware of 9 solar energy and 8 wind energy potential projects totaling 112,495 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 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** and **Table 3** of **Section B.3, Cumulative Scenario**. Of all the proposed renewable energy projects within the geographic scope of this analysis, the following, by virtue of size and location, have the greatest potential to affect paleontological resources within the geographic scope of this analysis:

- Palen Solar Power Project (5,200 acres)
- Genesis Solar Energy Project (4,460 acres)
- Desert Quartzite (7,724 acres)
- Mule Mountain Solar Project (2,684 acres)
- Big Maria Vista Solar Project (2,684 acres)
- Chuckwalla Solar 1 (4,097 acres)

These projects would be subject to CEC 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.

These projects would most likely include ground water pumping of similar magnitude to the GSEP; however, the combined effect of these projects would still result in much less than the historic rate of 48,000 AFY, which did not result in any documented regional subsidence, such that significant impacts to regional subsidence would not be expected. Therefore, there would be no significant cumulative contribution to regional subsidence from foreseeable renewable projects in the California Desert.

D.2.9.3.3 Contribution of the Genesis Solar Energy Project to Cumulative Impacts

Construction

The construction of the GSEP is not expected to require any significant amount of ground water pumping such that impacts to regional subsidence are not expected. Construction of the project would require localized excavation over a very large area. Because the project area lies within geological 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 GSEP 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 GSEP, 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 GSEP is expected to result in minor increased annual ground water pumping, from the current 2,000 AFY to approximately 3,600 AFY. Historic ground water withdrawals on the order of 48,000 AFY did not result in any documented subsidence in the proposed project area. Since operation of the GSEP would only contribute a minor amount of additional ground water withdrawal to the overall amount in the Chuckwalla Valley and since this cumulative amount is only a fraction of historic pumping levels that did not result in any documented subsidence, operation of the GSEP is not expected to impact regional subsidence.

The operation of the GSEP 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 affects on paleontological resources. The longer the plant operates, however, the more likely it is to be damaged by geological 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 GSEP is not expected to require any significant amount of ground water pumping such that impacts to regional subsidence are not expected. The decommissioning of the Genesis 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.

D.2.9.4 OVERALL CONCLUSION

Potential impacts, as they pertain to geological hazards, are essentially limited to regional subsidence due to ground water withdrawal. Historic ground water withdrawals on the order of 48,000 AFY did not result in any documented subsidence in the proposed project area. The proposed GSEP project would result in increased annual ground water pumping, from the current 2,000 AFY to approximately 3,600 AFY. However, this is still only a fraction of historic withdrawals and therefore, the proposed GSEP project would not contribute to any increase of this potential hazard. In addition, a significant number of large-scale ground water pumping operations would have to be constructed to have any measurable impact on the proposed facility.

Paleontological resources have been documented in the general area of the project. As the value of paleontological resources is associated with their discovery within a specific geological host unit, the potential impacts to paleontological resources due to construction activities will be mitigated as required by proposed Conditions of Certification **PAL-1** through **PAL-7**. Implementation of these conditions 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, in consideration with other nearby similar projects, should be either neutral (no fossils encountered) or positive (fossils encountered, preserved, and identified).

Based on the above discussion, staff believes that the potential for significant adverse cumulative impacts to the proposed project from geological hazards during the project's design life is negligible and that the potential for impacts to geological, mineralogical, and paleontological resources is very low.

The proposed conditions of certification allow the BLM Authorized Office and the Energy Commission CPM and the applicant to adopt a compliance monitoring scheme ensuring compliance with applicable LORS for geological hazards and geological, mineralogical, and paleontological resources.

D.2.10 COMPLIANCE WITH LORS

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

D.2.11 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. 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 GSEP facility, in accordance with an approved Paleontological Monitoring and Mitigation Plan, could result in fossil discoveries which would enhance our understanding of the prehistoric climate, geology, and geographic setting of the region for the benefit of current and future generations.

D.2.12 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 paleontological conditions of certification follow. It is staff's opinion that the likelihood of encountering paleontological resources is moderate at the plant site.

PAL-1 The project owner shall provide the Compliance Project Manager (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 Society of Vertebrate Paleontology (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;

2. Ability to recognize and collect fossils in the field;

3. Local geological and biostratigraphic expertise;

4. Proficiency in identifying vertebrate and invertebrate fossils; and

5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. Paleontological Resource Monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to the CPM. The letter

shall be provided to the CPM no later than one week prior to the monitor's beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM, for approval, maps and drawings showing the footprint of the power plants, 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 of 1 inch = 40 feet to 1 inch = 100 feet range. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS and CPM.

If construction of the ISEGS project proceeds in phases, maps and drawings may be submitted prior to the start of each power plant. A letter identifying the proposed schedule of each project power plant shall be provided to the PRS, and CPM. Before work commences on affected power plants, 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 CPM.

(2) If there are changes to the footprint of the project, revised maps and drawings shall be provided to the{RS CPM at least 15 days prior to the start of ground disturbance.

(3) If there are changes to the scheduling of the construction phases of each power plant, the project owner shall submit a letter to BLM's Authorized Officer and the CPM within 5 days of identifying the changes.

PAL-3 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted, the project owner shall ensure that the PRS prepares, and the project owner submits to the CPM for review and approval, a paleontological resources monitoring and mitigation plan (PRMMP) to identify general and specific measures to minimize potential impacts to significant paleontological resources. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with CPM approval. This document shall be used as the basis of discussion

when on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner's on-site manager and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 1995) and shall include, but not be limited, to the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;

2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the conditions of certification;

3. A thorough discussion of the anticipated geological 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 If after review of the plans provided pursuant to **PAL-2**, the PRS determines that materials with moderate, high, or unknown paleontological sensitivity could be impacted then, 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 geological 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 resource monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of BLM Authorized Officer- and CPM-approved paleontological resource report (see **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a

statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to the CPM.

D.2.13 CONCLUSIONS

The applicant should easily be able to comply with applicable LORS, provided that the proposed conditions of certification are implemented and followed. The design and construction of the project should have no adverse impact with respect to geological, mineralogical, and paleontological resources. Staff proposes to ensure compliance with applicable LORS through the adoption of the proposed conditions of certification listed above.

Certification of Completion
Worker Environmental Awareness Program
Genesis Solar Energy Project (09-AFC-8)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
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Cultural Trainer: _____ Signature:_____ Date: ___/___/____

PaleoTrainer: _____ Signature:_____ Date: ___/___/____

Biological Trainer: _____Signature:_____ Date:___/___/__

D.2.14 REFERENCES

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D.3 – POWER PLANT EFFICIENCY

Testimony of Shahab Khoshmashrab

D.3.1 Summary of Conclusions

The Genesis Solar Energy Project (GSEP), if constructed and operated as proposed, would generate 250 megawatts (MW) (nominal net output) of electricity. GSEP would be a solar thermal power plant employing parabolic trough technology and would occupy approximately 1,800 acres (plant facilities and solar field) in Riverside County, California. The project would consist of two independent concentrated solar electric generating plants with a nominal net electrical output of 125 MW each. The plants would use natural gas-fueled auxiliary boilers to reduce startup time and provide heat transfer fluid freeze protection. GSEP would use solar energy to generate most all of its capacity; fossil fuel (natural gas) would be used for power production during startup only.

The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume significant quantities of fossil fuel energy (compared to a fossil fuel power plant of equal electrical output) in a wasteful or inefficient manner. No efficiency standards apply to this project. U.S. Bureau of Land Management (BLM) and Energy Commission staff (hereafter jointly referred to as staff) therefore concludes that this project would present no significant adverse impacts on fossil fuel energy resources.

GSEP, if constructed and operated as proposed, would occupy nearly seven acres per MW of power output, a figure roughly 30 percent higher than some other solar power technologies and roughly 20 percent lower than, yet, some other solar power technologies (see **Efficiency Table 1**).

D.3.2 Introduction

Fossil Fuel Use Efficiency

One of the responsibilities of the California Energy Commission (Energy Commission) is to make findings on whether the energy use by a power plant, including the proposed GSEP, would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that GSEP's energy consumption creates a significant adverse impact, it must further determine if feasible mitigation measures could eliminate or minimize that impact. In this analysis, staff addresses the inefficient and unnecessary consumption of energy.

In order to support the Energy Commission's findings, this analysis will:

- examine whether the facility would likely present any adverse impacts upon energy resources;
- examine whether these adverse impacts are significant; and if so,

- examine whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a level of insignificance.

Solar Land Use Efficiency

Solar thermal power plants typically consume much less fossil fuel (usually in the form of natural gas) than other types of thermal power plants. Therefore, common measures of power plant efficiency such as those described above are less meaningful. So far as Energy Commission staff can determine, methods for determining the efficiency of a solar power plant have yet to be standardized; research has uncovered no meaningful attempt to quantify efficiency. The solar power industry appears to have begun discussing the issue, and, a consensus is forthcoming (CEC 2008a). In the absence of accepted standards, staff proposes the following approach.

Solar thermal power plants convert the sun's energy into electricity in three basic steps:

- Mirrors and/or collectors capture the sun's rays.
- This solar energy is converted into heat.
- This heat is converted into electricity, typically in a heat engine such as a steam turbine generator or a Stirling Engine-powered generator.

The effectiveness of each of these steps depends on the specific technology employed; the product of these three steps determines the power plant's overall solar efficiency. The greater the project's solar efficiency, the less land the plant must occupy to produce a given power output.

The most significant environmental impacts caused by solar power plants result from occupying large expanses of land. The extent of these impacts is likely in direct proportion to the number of acres affected. For this reason, staff will evaluates the land use efficiency of proposed solar power plant projects. This efficiency will be expressed in terms of power produced, or MW per acre, and in terms of energy produced, or MW-hours per acre-year. Specifically:

- Power-based solar land use efficiency is calculated by dividing the maximum net power output in MW by the total number of acres impacted by the power plant, including roads and electrical switchyards and substations.
- Energy-based solar land use efficiency is calculated by dividing the annual net electrical energy production in MW-hours per year by the total number of acres impacted by the power plant. Since different solar technologies consume differing quantities of natural gas for morning warm-up, cloudy weather output leveling and heat transfer fluid freeze protection (and some consume no gas at all), this effect will be accounted for. Specifically, gas consumption will be calculated out by reducing the plant's net energy output by the amount of energy that could have been produced by consuming the project's annual gas consumption in a modern combined cycle power plant. This reduced energy output will then be divided by acres impacted.

D.3.3 Methodology and Thresholds for Determining Environmental Consequences

The project would consist of arrays of parabolic mirrors, solar steam generator heat exchangers, two steam turbine generators, and two wet cooling towers (GSEP 2009a, AFC §3.4.2).

The project's power cycle would be based on a steam cycle (also known as the Rankine cycle) (GSEP 2009a, AFC §3.4). The solar steam generator heat exchangers would receive heated heat transfer fluid from the solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun. The heated heat transfer fluid would be used to generate steam in the heat exchangers. This steam would then expand through the steam turbine generators to produce electrical power.

The project would utilize two auxiliary boilers fueled by natural gas to reduce startup time and to keep the temperature of the heat transfer fluid above its relatively high freezing point (54 degrees Fahrenheit [°F]). Except during startup, the project would not use fossil fuel to generate electricity.

There are currently no legal or industry standards for measuring the efficiency of solar thermal power plants (CEC 2008a).

Adverse Effects On Energy Supplies and Resources

The applicant has described its sources of natural gas for the project (GSEP 2009a AFC §3.4.6). Natural gas would be delivered to the project site via a new six-mile long, eight-inch diameter pipeline connected to an existing Southern California Edison (SCE) pipeline connection located north of Interstate 10. SCE's natural gas supply system is currently plentiful and California's access to natural gas resources from the Rocky Mountains, Canada and the southwest represent considerable energy resources in California. Therefore, it appears highly unlikely that the project would create a substantial increase in fossil fuel demand.

Additional Energy Supply Requirements

Since supplying the project with natural gas would consume such an insignificant amount of energy, there is no likelihood that additional energy supplies would be required.

Compliance With Energy Standards

No standards apply to the efficiency of this project or other non-cogeneration projects.

Alternatives To Reduce Wasteful, Inefficient, and Unnecessary Energy Consumption

Staff evaluates the project alternatives to determine if alternatives exist that could reduce the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) requires the examination of the project's energy consumption. The project's fuel consumption would

be negligible, therefore staff need not evaluate alternatives that could reduce or eliminate the use of natural gas.

Efficiency of Alternatives to the Project

The project's objectives include the generation of electricity using the concentrated parabolic trough solar thermal technology (GSEP 2009a, AFC §2.1).

Alternative Generating Technologies

Alternative generating technologies for GSEP are considered in the AFC (GSEP 2009a, AFC §3.10.8). For purposes of this analysis, natural gas, oil, coal, nuclear, geothermal, biomass, hydroelectric, wind and other solar technologies are all considered. Given the project objectives, location, air pollution control requirements, and the commercial availability of the above technologies, staff agrees with the applicant that the selected solar thermal technology is a reasonable selection.

Staff, therefore, believes that GSEP would not constitute a significant adverse impact on fossil fuel energy resources compared to feasible alternatives.

D.3.4 Proposed Project

D.3.4.1 SETTING AND EXISTING CONDITIONS

The project would consist of arrays of parabolic mirrors, solar steam generator heat exchangers, two steam turbine generators, and two wet cooling towers (GSEP 2009a, AFC §3.4.2).

The project's power cycle would be based on a steam cycle (also known as the Rankine cycle) (GSEP 2009a, AFC §3.4).The solar steam generator heat exchangers would receive heated heat transfer fluid from the solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun. The heated heat transfer fluid would be used to generate steam in the heat exchangers. This steam would then expand through the steam turbine generators to produce electrical power.

The project would utilize two auxiliary boilers fueled by natural gas to reduce startup time and to keep the temperature of the heat transfer fluid above its relatively high freezing point (54 degrees Fahrenheit [°F]). Except during startup, the project would not use fossil fuel to generate electricity.

D.3.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Project Energy Requirements and Energy Use Efficiency

The project would consist of arrays of parabolic mirrors, solar steam generator heat exchangers, two steam turbine generators, and two wet cooling towers (GSEP 2009a, AFC §3.4.2).

The project's power cycle would be based on a steam cycle (also known as the Rankine cycle) (GSEP 2009a, AFC §3.4).The solar steam generator heat exchangers would

receive heated heat transfer fluid from the solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun. The heated heat transfer fluid would be used to generate steam in the heat exchangers. This steam would then expand through the steam turbine generators to produce electrical power.

The project would utilize two auxiliary boilers fueled by natural gas to reduce startup time and to keep the temperature of the heat transfer fluid above its relatively high freezing point (54 degrees Fahrenheit [°F]). Due to the project's negligible consumption of natural gas (for use during start-up only), staff considers the impact of the project's fuel consumption on energy supplies and energy efficiency to be less than significant.

Adverse Effects on Energy Supplies and Resources

The applicant has described its sources of natural gas for the project (GSEP 2009a AFC §3.4.6). Natural gas would be delivered to the project site via a new six-mile long, eight-inch diameter pipeline connected to an existing SCE pipeline connection located north of Interstate 10. SCE's natural gas supply system is currently plentiful and California's access to natural gas resources from the Rocky Mountains, Canada and the southwest represent considerable energy resources in California. Therefore, it appears highly unlikely that the project would create a substantial increase in fossil fuel demand.

Additional Energy Supply Requirements

Since supplying the project with natural gas would consume such an insignificant amount of energy, there is no likelihood that additional energy supplies would be required.

Compliance with Energy Standards

No standards apply to the efficiency of this project or other non-cogeneration projects.

Alternatives to Reduce Wasteful, Inefficient, and Unnecessary Energy Consumption

Staff evaluates the project alternatives to determine if alternatives exist that could reduce the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) requires the examination of the project's energy consumption. The project's fuel consumption would be negligible, therefore staff is not evaluating alternatives that could reduce or eliminate the use of natural gas.

Alternative Generating Technologies

Alternative generating technologies for GSEP are considered in the AFC (GSEP 2009a, AFC §3.10.8). For purposes of this analysis, natural gas, oil, coal, nuclear, geothermal, biomass, hydroelectric, wind and other solar technologies are all considered. Given the project objectives, location, air pollution control requirements, and the commercial availability of the above technologies, staff agrees with the applicant that the selected solar thermal technology is a reasonable selection.

Staff, therefore, believes that the GSEP Project would not constitute a significant adverse impact on fossil fuel energy resources compared to feasible alternatives.

Method and Threshold for Determining the Significance of Solar Land Use Energy Resources

The solar insolation falling on the earth's surface can be regarded as an energy resource. Since this energy is inexhaustible, its consumption does not present the concerns inherent in fossil fuel consumption. What is of concern, however, is the extent of land area required to capture this solar energy and convert it to electricity. Setting aside hundreds or thousands of acres of land for solar power generation removes it from alternative uses. Constructing buildings and solar collector foundations can disturb environmental resources.

Staff tabulates the land use efficiency of the project (described above) and compares it to similar measures for other solar power plant projects that have passed through, or are passing through the Energy Commission's licensing process.

As this is written, several solar power plant projects have progressed significantly through the Energy Commission siting process. Several of these projects' power and energy output, and the extent of the land occupied by them, are summarized in **Efficiency Table 1**, below. The solar land use efficiency for a typical natural gas-fired combined cycle power plant is shown only for comparison.

Adverse Effects on Land Use

A solar power project that occupies more land than another project holds the potential to produce more land use-related environmental impacts.

Project Land Use

GSEP would produce power at the rate of 250 MW net, and would generate energy at the rate of 600,000 MW-hours net per year, while occupying 1,800 acres (GSEP 2009a, AFC §§3.4.1, 3.4.2, 3.10). Staff calculates power-based land use efficiency thus:

Power-based efficiency: 250 MW ÷ 1,800 acres = **0.14 MW/acre** or **7.2 acres/MW**

Staff calculates energy-based land use efficiency thus:

600,000 MWh/year ÷ 1,800 acres = **333 MWh/acre-year**

As seen in **Efficiency Table 1**, GSEP, employing parabolic trough technology, is more efficient in use of land than the SES Solar One (Imperial) and SES Solar Two (Calico) projects, which would employ the Stirling Energy Systems "SunCatcher" technology, and the Ivanpah Solar Electric Generating System project, which would employ BrightSource's power tower technology. GSEP, if constructed and operated as proposed, would occupy nearly seven acres per MW of power output, a figure roughly 30 percent higher than some other solar power technologies and roughly 20 percent lower than, yet, some other solar power technologies (see **Efficiency Table 1**).

Alternatives to Reduce Solar Land Use Impacts

Building and operating a natural gas-fired combined cycle power plant would yield much greater land use efficiency than any solar power plant; see **Efficiency Table 1**.

However, this would not achieve the basic project objective, to generate electricity from the renewable energy of the sun and would not further the state's renewable energy development and green-house gas reduction goals.

Efficiency Table 1 demonstrates that the land use efficiency figure of GSEP nearly equates the median figure for all the solar thermal technologies currently passing through the Energy Commission's licensing process.

Alternative Heat Rejection System

The applicant proposes to employ wet cooling systems (evaporative cooling towers) as the means for rejecting power cycle heat from the steam turbine (GSEP 2009a, AFC §§1.0, 3.4.1). An alternative heat rejection system would utilize an air-cooled condenser.

The local climate in the project area is characterized by high temperatures and low relative humidity (low wet-bulb temperature). In low temperatures and high relative humidity (low dry-bulb temperature), the air-cooled condenser performs slightly more efficiently than the evaporative cooling tower. In high temperatures and low relative humidity, typical of the project area, the evaporative cooling tower performs slightly more efficiently than the air-cooled condenser (approximately 7.5%). However, such an improvement in efficiency may be less significant compared to the adverse environmental impacts of wet cooling over dry cooling, such as those identified in the **Soil and Water Resources** section of this document in terms of groundwater use.

Efficiency Table 1 — Solar Land Use Efficiency

Project	Generating Capacity (MW net)	Footprint (Acres)	Annual Energy Production (MWh net)	Annual Fuel Consumption (MMBtu LHV)	Land Use Efficiency (Power-Based) (MW/acre)	Land Use Efficiency (Energy – Based) (MWh/acre-year)	
						Total	Solar Only[1,2]
Genesis Solar	250	1,800	600,000	60,000	0.14	333	329
Ridgecrest Solar	250	1,440	500,000	44,818	0.17	347	343
Beacon Solar (08-AFC-2)	250	1,321	600,000	36,000	0.19	454	450
Ivanpah SEGS (07-AFC-5)	400	3,744	960,000	432,432	0.11	256	238
SES Solar One (08-AFC-13)	850	8,200	1,840,000	0	0.11	224	224
SES Solar Two (08-AFC-5)	750	6,500	1,620,000	0	0.12	249	249
San Joaquin Solar Hybrid	106	640	286,978	25,180	0.17	448	443
	106	640	774,000	5,899,500	0.17	1209	415
Solar Millenium (Blythe)	1000	5,950	2,100,000	172,272	0.17	353	349
Solar Millenium (Palen)	500	2970	1,000,000	89,636	0.17	337	332
Mojave Solar	250	1684	630,000	94,280	0.15	374	366
Rice Solar	150	1,410	450,000	0	0.11	319	319
Avenal Energy (08-AFC-1)[3]	600	25	3,023,388	24,792,786	24.0	120,936	N/A

[1] Similar to another Solar Millenium (Palen).
[2] Net energy output is reduced by natural gas-fired combined cycle proxy energy output; see **Efficiency Appendix A**.
[3] Example natural gas-fired combined cycle plant.

Project Closure

GSEP is expected to have a lifespan of 30 years (GSEP 2009a, AFC §3.9.2). 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 CEC 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.

D.3.4.3 CEQA LEVEL OF SIGNIFICANCE

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (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).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- adverse effects on local and regional energy supplies and energy resources;
- a requirement for additional energy supply capacity;
- noncompliance with existing energy standards; or
- the wasteful, inefficient, and unnecessary consumption of fuel or energy.

D.3.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50% percent of the proposed project area so all impacts are reduced, and (2) by retaining the eastern solar field, which is located on flowing desert washes, it would potentially reduce impacts to the sand dune and playa areas and to the Mojave Fringe-toed Lizard habitat. The alternative could also potentially reduce impacts to wildlife movement by reducing obstruction of the Palen wash and would maintain, thru

both fluvial and Aeolian processes, the dune and sandy habitats. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

D.3.5.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

D.3.5.2 Assessment of Impacts and Discussion of Mitigation

Since the Reduced Acreage plant output would produce only 125 MW (50 percent of the proposed project), its impacts on the San Diego Gas & Electric grid would be proportionately less. Since the Reduced Acreage plant would produce 125 MW while occupying approximately 50 percent of the land needed for the proposed project, its power-based land use efficiency would be about the same as the proposed project.

D.3.5.3 CEQA Level of Significance

If the Reduced Acreage alternative were constructed, the CEQA Level of Significance, as measured by land use efficiency, would amount to approximately the same levels described for the proposed project.

D.3.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power blocks, as illustrated in **Alternatives Figure 2** (see Section B.3).

According to the applicant, approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans would operate when the ambient temperature is above 50 degrees Fahrenheit (GSEP 2009f). When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

D.3.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporates the use of air-cooled

condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

D.3.6.2 Assessment of Impacts and Discussion of Mitigation

The local climate in the project area is characterized by high temperatures and low relative humidity (low wet-bulb temperature). In low temperatures and high relative humidity (low dry-bulb temperature), the air-cooled condenser performs slightly more efficiently than the evaporative cooling tower. In high temperatures and low relative humidity, typical of the project area, the evaporative cooling tower performs slightly more efficiently than the air-cooled condenser (approximately 7.5%). However, such an improvement may be less significant compared to the adverse environmental impacts of wet cooling over dry cooling, such as those identified in the **Soil and Water Resources** section of this document.

D.3.6.3 CEQA Level of Significance

In weather conditions typical of the project area the evaporative cooling tower performs slightly more efficiently than the air-cooled condenser. However, such an improvement may be less significant compared to the adverse environmental impacts of wet cooling over dry cooling, such as those identified in the **Soil and Water Resources** section of this document.

D.3.7 NO PROJECT / NO ACTION ALTERNATIVE

The No Project Alternative under CEQA or the No Action Alternative under NEPA defines the scenario that would exist if the proposed Genesis Project were not constructed. The CEQA Guidelines state that “the purpose of describing and analyzing a ‘no project’ alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project” (Cal. Code Regs., tit. 14 § 15126.6(i)). The No Project analysis in this SA/DEIS considers existing conditions and “what would be reasonably expected to occur in the foreseeable future if the project were not approved…” (Cal. Code Regs, tit. 14 § 15126.6(e)(2)). Under NEPA, the No Action Alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives.

If the No Project/No Action Alternative were selected, the construction and operational impacts of the GSEP would not occur. There would be no grading of the site, no loss of resources or disturbance of approximately 1,800 acres of desert habitat, no impacts to cultural resources, and no installation of power generation and transmission equipment. The No Project/No Action Alternative would also eliminate contributions to cumulative impacts on a number of resources and environmental parameters in Riverside County and in the Colorado Desert as a whole.

In the absence of the Genesis Project, however, other power plants, both renewable and non-renewable, would have to be constructed to serve the demand for electricity and to meet RPS. If the No Project/No Action Alternative were chosen, other utility-scale solar power facilities may be built, and the impacts to the environment may be similar to those of the proposed project because these technologies require large amounts of land

like that required for the GSEP. The No Project/No Action Alternative may also lead to licensing of other non-solar renewable technologies to help achieve the California RPS.

Additionally, if the No Project/No Action Alternative were chosen, it is likely that additional gas-fired power plants would be built or that existing gas-fired plants could operate longer. If the proposed project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide, and PG&E would not receive the 250 MW contribution to its renewable state-mandated energy portfolio. If a fossil-fueled power plant is built in place of GSEP, adverse impacts on energy resources and supply would occur. However, the extent of those impacts would have to be analyzed at the time of project licensing.

D.3.8 CUMULATIVE IMPACT ANALYSIS

Geographic Extent

The geographic scope for considering cumulative impacts on electric system efficiency for this project is the SCE grid.

Existing Cumulative Conditions

The SCE grid includes many natural gas-fired power plants and a growing number of solar and wind power plants. The ratio of gas-fired to renewable energy power plants is currently high. GSEP, when combined with the other power plants in the SCE grid system, would create no cumulative impacts on power plant efficiency.

Future Foreseeable Projects

Future projects on the SCE grid will likely include numerous solar and wind power plants, as well as more natural gas-fired peaking plants. The ratio of gas-fired to renewable energy power plants is likely to drop as SCE acquires more solar and wind power energy in response to government mandates to increase the portion of energy produced from renewable sources.

Foreseeable Projects in the Project Area

No new power plant projects, gas-fired or renewable, are projected in the project area.

Foreseeable Renewable Projects in the California and Arizona Desert

Numerous solar, wind power and geothermal projects are foreseeable in the deserts of California and Arizona. However, the efficiency of GSEP will neither affect, nor be affected by, the efficiency of these projects. Each project's efficiency affects only that project, and could not produce a cumulative effect that could involve other projects.

D.3.9 Compliance with LORS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

D.3.10 Noteworthy Public Benefits

The GSEP project would employ an advanced solar thermal technology. Solar energy is renewable and unlimited. The project would have a less than significant adverse impact on nonrenewable energy resources (natural gas). Consequently, the project would help in reducing California's dependence on fossil fuel-fired power plants.

D.3.11 Proposed Conditions of Certification/Mitigation Measures

No conditions of certification are proposed.

D.3.12 Conclusions

Fossil fuel energy use

GSEP, if constructed and operated as proposed, would use solar energy to generate most of its capacity, consuming insignificant amounts of natural gas for power production only during startup. The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on energy resources. No cumulative impacts on energy resources are likely. Facility closure would not likely present significant impacts on electric system efficiency.

Land use

GSEP, if constructed and operated as proposed, would occupy nearly seven acres per MW of power output, a figure roughly 30 percent higher than some other solar power technologies and roughly 20 percent lower than, yet, some other solar power technologies (see **Efficiency Table 1**).

D.3.13 References

CEC 2008a – Report of Conversation between Steve Baker and Golam Kibrya – CEC staff. February 22, 2008.

GSEP 2009a – Genesis Solar Energy Project/T. Bernhardt (tn:53083) Application for Certification for the Genesis Solar Energy Project. 08/31/2009

D.4 - POWER PLANT RELIABILITY

Testimony of Shahab Khoshmashrab

D.4.1 SUMMARY OF CONCLUSIONS

The applicant predicts an equivalent availability factor of 96-98 percent, which staff believes is achievable. (The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability.) Based on a review of the proposal, staff concludes that the Genesis Solar Energy Project (GSEP) would be built and would operate in a manner consistent with industry norms for reliable operation. No conditions of certification are proposed.

D.4.2 INTRODUCTION

In this analysis, California Energy Commission (Energy Commission) staff addresses the reliability issues of the GSEP project to determine if the power plant is likely to be built in accordance with typical industry norms for reliable power generation. Staff uses this norm as a benchmark because it ensures that the resulting project would not be likely to degrade the overall reliability of the electric system it serves (see the “Setting” subsection, below).

The scope of this power plant reliability analysis covers:

- equipment availability;
- plant maintainability;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliable power generation. While the applicant has predicted an equivalent availability factor of 96-98 percent for the GSEP (see below), staff uses typical industry norms as the benchmark, rather than the applicant’s projection, to evaluate the project’s reliability.

D.4.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to how a project is designed, sited, and operated in order to ensure its safe and reliable operation (Title 20, CCR §1752[c]). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is likely the case if a project is at least as reliable as other power plants on that system.

The availability factor of a power plant is the percentage of time it is available to generate power; both planned and unplanned outages subtract from this availability. Measures of power plant reliability are based upon both the plant's actual ability to generate power when it is considered to be available and upon starting failures and unplanned (or forced) outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate. Throughout its intended 30-year life, the GSEP is expected to operate reliably (GSEP 2009a, AFC § 3.9.2). Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability requires adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for a project and compares them to industry norms. If the factors compare favorably for this project, staff will then conclude that the GSEP would be as reliable as other power plants on the electric system and would not degrade system reliability.

D.4.4 PROPOSED PROJECT

D.4.4.1 SETTING AND EXISTING CONDITIONS

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (California ISO), that purchase, dispatch, and sell electric power throughout the state. Determining how the California ISO and other control area operators would ensure system reliability has been an ongoing effort. Protocols have been developed and put in place that allow sufficient reliability to be maintained under the competitive market system. "Must-run" power purchase agreements and "participating generator" agreements are two mechanisms that have been employed to ensure an adequate supply of reliable power.

In September 2005, California AB 380 (Núñez, Chapter 367, Statutes of 2005) became law. This modification to the Public Utilities Code requires the California Public Utilities Commission to consult with the California ISO to establish resource adequacy requirements for all load-serving entities (basically, publicly and privately owned utility companies). These requirements include maintaining a minimum reserve margin (extra generating capacity to serve in times of equipment failure or unexpected demand) and maintaining sufficient local generating resources to satisfy the load-serving entity's peak demand and operating reserve requirements.

In order to fulfill this mandate, the California ISO has begun to establish specific criteria for each load-serving entity under its jurisdiction. These criteria guide each load-serving entity in deciding how much generating capacity and ancillary services to build or purchase, after which the load-serving entity issues power purchase agreements to satisfy these needs.

The California ISO's mechanisms to ensure adequate power plant reliability apparently were devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants

of past decades. However, there has been valid cause to believe that, under free market competition, financial pressures on power plant owners to minimize capital outlays and maintenance expenditures may act to reduce the reliability of many power plants, both existing and newly constructed (McGraw-Hill 1994). It is possible that, if significant numbers of power plants were to exhibit individual reliability sufficiently lower than this historical level, the assumptions used by California ISO to ensure system reliability would prove invalid, with potentially disappointing results. Accordingly, staff has recommended that power plant owners continue to build and operate their projects to the level of reliability to which all in the industry are accustomed.

As part of its plan to provide needed reliability, the applicant proposes to operate the 250-megawatt (MW) (net power output) GSEP, a solar thermal power plant facility employing advanced solar power technology. This project, using renewable solar energy, would provide dependable power to the grid, generally during the hours of peak power consumption by the interconnecting utility(s). This project would help serve the need for renewable energy in California, as all its generated electricity would be produced by a reliable source of energy that is available during the hot summer afternoons, when power is needed most.

The project is expected to achieve an equivalent availability factor in the range of 96-98 percent. The project is anticipated to operate at an annual capacity factor of approximately 27 percent (GSEP 2009a, AFC § 3.4.2).

D.4.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

EQUIPMENT AVAILABILITY

Equipment availability would be ensured by adoption of appropriate quality assurance/quality control (QA/QC) programs during the design, procurement, construction, and operation of the plant and by providing for the adequate maintenance and repair of the equipment and systems discussed below.

Quality Control Program

The applicant describes a QA/QC program (GSEP 2009a, AFC § 3.4) that is typical of the power industry. Equipment would be purchased from qualified suppliers based on technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA programs, and quality history would be evaluated. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Staff expects that implementation of this program would result in standard reliability of design and construction. To ensure this implementation, staff has proposed appropriate conditions of certification in the section of this document entitled **Facility Design**.

PLANT MAINTAINABILITY

Equipment Redundancy

The project, as proposed in the AFC, would be able to operate only when the sun is shining. Maintenance or repairs could be done when the plant is shut down at night.

This would help to enhance the project's reliability. Also, the applicant proposes to provide redundant pieces of equipment for those that are most likely to require service or repair (GSEP 2009a, AFC §§ 3.4.3, 3.4.4, 3.11.6). This redundancy would allow service or repair to be done during sunny days when the plant is in operation, if required. Major plant systems are designed with adequate redundancy to ensure their continued operation if equipment fails.

Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products, and the applicant would base the project's maintenance program on those recommendations (GSEP 2009a, AFC §§ 3.4, 3.11). The program would encompass both preventive and predictive maintenance techniques. Maintenance outages would probably be planned for periods of low electricity demand. Staff expects that the project would be adequately maintained to ensure an acceptable level of reliability.

FUEL AND WATER AVAILABILITY

The long-term availability of fuel and of water for cooling or process use is necessary to ensure the reliability of any power plant. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant could be curtailed, threatening both the power supply and the economic viability of the plant.

Fuel Availability

The GSEP would consume insignificant amounts of natural gas for power generation. The sole consumption of natural gas would be to reduce startup time and to keep the temperature of the heat transfer fluid above its freezing point.

Natural gas would be delivered to the GSEP site by a six-mile-long, eight-inch-diameter natural gas pipeline that will be connected to an existing Southern California Edison (SCE) pipeline (GSEP 2009a, AFC § 3.4.6). The SCE natural gas supply system draws from extensive supplies originating in the Rocky Mountains, in the southwest, and in Canada, and is capable of delivering the required amount of gas to this project. Staff believes that there will be adequate fuel supply to meet the project's needs.

Water Supply Reliability

The GSEP has proposed to use groundwater water from on-site wells for domestic and industrial water needs, including steam cycle makeup, mirror washing, service water and fire protection water. This source of water supply appears to be sufficient for the project (see **Soil and Water Resources** section of this document). Therefore, staff concludes that this source of water supply is a reliable source of water for the project.

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. Tsunamis (tidal waves) and seiches (waves in inland bodies of water) are not likely to present hazards for this project, but seismic shaking (earthquakes) and flooding could present credible threats to the project's reliable operation (GSEP 2009a, AFC §§1.2, 2.5.6.6).

Seismic Shaking

The project will be designed and constructed to the latest applicable LORS (please see the section of this document entitled **Facility Design**). Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it would be built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see the section of this document entitled **Facility Design**. In light of the general historical performance of California power plants and the electrical system in seismic events, staff has no special concerns with the power plant's functional reliability during earthquakes. Please also see the "Faulting and Seismicity" portion of the **Geology and Paleontology** section of this document

Flooding

The project site is relatively flat and generally slopes from north to south with elevations of approximately 400 to 370 feet above mean sea level. The Federal Emergency Management Agency has not mapped the site for the presence of floodplains, but for the vast majority of the time, the area is dry and devoid of any surface flow anywhere in the project area (GSEP 2009a, AFC §§ 3.3, 4.1.1.1). With proper plant design (ensured by adherence to the proposed **Facility Design** conditions of certification), staff believes there should be no significant concerns with power plant functional reliability due to flooding. For further discussion, see **Soil and Water Resources** and **Geology and Paleontology**.

COMPARISON WITH EXISTING FACILITIES

The North American Electric Reliability Corporation (NERC) maintains industry statistics for availability factors (as well as other related reliability data). The NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System and periodically summarizes and publishes those statistics on the Internet at <http://www.nerc.com>. Because no statistics are available for solar power plants, staff compares the project's availability factor to the average availability factor of fossil fuel-fired units. Also because the project's total net power output would be 250 MW, staff uses the NERC statistics for 200–299 MW units. The NERC reported an availability factor of 86.01 percent as the generating unit average for the years 2002 through 2006 for fossil fuel units of 200-299 MW (NERC 2007).

The concentrated parabolic trough solar thermal technology is not new. This technology has been employed for over 20 years at the nearby NextEra owned and operated Solar Electric Generating System facilities (SEGS) in the Mojave Desert. Staff believes that the parabolic trough technology is likely to exhibit the projected reliability.

The project would use multi-pressure condensing steam turbine technology. Steam turbines incorporating this technology have been on the market for many years now and are expected to exhibit typically high availability. Also, because solar-generated steam is cleaner than burnt fossil fuel, the GSEP steam cycle units would likely require less frequent maintenance than units that burn fossil fuel. Therefore, the applicant's

expectation of an annual availability factor of 96-98 percent (GSEP 2009a, AFC § 3.4.2) appears reasonable when compared with the NERC figures throughout North America (see above). In fact, these machines might well be expected to outperform the fleet of various turbines (mostly older and smaller) that make up NERC statistics. Additionally, the project, as proposed, would be able to operate only when the sun is shining. Maintenance or repairs could be done when the plant is shut down at night.

The applicant's estimate of plant availability, therefore, appears to be realistic. Stated procedures for assuring the design, procurement, and construction of a reliable power plant appear to be consistent with industry norms, and staff believes they are likely to ultimately produce an adequately reliable plant.

D.4.4.3 CEQA LEVEL OF SIGNIFICANCE

A discussion of the CEQA level of significance is not necessary because the CEQA guidelines do not apply to power plant reliability.

D.4.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50% percent of the proposed project area so all environmental impacts are reduced, and (2) by retaining the eastern solar field, which is located on flowing desert washes, it would reduce impacts to the sand dune and playa areas and to the Mojave Fringe-toed Lizard habitat. The alternative would also reduce impacts to wildlife movement by reducing obstruction of the Palen wash and would maintain, thru both fluvial and Aeolian processes, the dune and sandy habitats. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

D.4.5.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

D.4.5.2 Assessment of Impacts and Discussion of Mitigation

The impacts of this alternative on reliability would be the same as those described above for the proposed project

D.4.5.3 CEQA Level of Significance

A discussion of the CEQA level of significance is not necessary because the CEQA guidelines do not apply to power plant reliability.

D.4.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are

currently proposed for each of the two 125 MW power blocks, as illustrated in **Alternatives Figure 2** (see Section B.3).

According to the applicant, approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans would operate when the ambient temperature is above 50 degrees Fahrenheit (GSEP 2009f). When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY.

D.4.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporates the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

D.4.6.2 Assessment of Impacts and Discussion of Mitigation

The local climate in the project area is characterized by high temperatures and low relative humidity (low wet-bulb temperature). In low temperatures and high relative humidity (low dry-bulb temperature), the air-cooled condenser performs slightly more efficiently than the evaporative cooling tower. In high temperatures and low relative humidity, typical of the project area, the evaporative cooling tower performs slightly more efficiently than the air-cooled condenser. However, such an improvement may be less significant compared to the adverse environmental impacts of wet cooling over dry cooling, such as those identified in the **Soil and Water Resources** section of this document.

D.4.7 NO PROJECT / NO ACTION ALTERNATIVE

The No Project Alternative under CEQA or the No Action Alternative under NEPA defines the scenario that would exist if the proposed Genesis Project were not constructed. The CEQA Guidelines state that “the purpose of describing and analyzing a ‘no project’ alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project” (Cal. Code Regs., tit. 14 § 15126.6(i)). The No Project analysis in this SA/EIR considers existing conditions and “what would be reasonably expected to occur in the foreseeable future if the project were not approved…” (Cal. Code Regs, tit. 14 § 15126.6(e)(2)). Under NEPA, the No Action Alternative is used as a benchmark of existing conditions by which the public and decision makers can compare the environmental effects of the proposed action and the alternatives.

If the No Project/No Action Alternative were selected, the construction and operational impacts of the GSEP would not occur. There would be no grading of the site, no loss of resources or disturbance of approximately 1,800 acres of desert habitat, no impacts to cultural resources, and no installation of power generation and transmission equipment. The No Project/No Action Alternative would also eliminate contributions to cumulative impacts on a number of resources and environmental parameters in Riverside County and in the Colorado Desert as a whole.

In the absence of the Genesis Project, however, other power plants, both renewable and non-renewable, would have to be constructed to serve the demand for electricity and to meet RPS. If the No Project/No Action Alternative were chosen, other utility-scale solar power facilities may be built, and the impacts to the environment may be similar to those of the proposed project because these technologies require large amounts of land like that required for the GSEP. The No Project/No Action Alternative may also lead to licensing of other non-solar renewable technologies to help achieve the California RPS.

Additionally, if the No Project/No Action Alternative were chosen, it is likely that additional gas-fired power plants would be built or that existing gas-fired plants could operate longer. If the proposed project were not built, California would not benefit from the reduction in greenhouse gases that this facility would provide, and PG&E would not receive the 250 MW contribution to its renewable state-mandated energy portfolio.

D.4.8 CUMULATIVE IMPACT ANALYSIS

Geographic Extent

Any reliability impacts caused by the project would act upon the SCE power system.

Existing Cumulative Conditions

The SCE system is projected to serve a peak load, in the year 2013 of nearly 24,000 MW (CEC 2007). SCE currently acquires power from numerous sources, chiefly fossil fuel-fired and nuclear.

Future Foreseeable Projects

The power to serve the SCE system demand would be acquired from numerous sources, some of which would be solar power plants. The GSEP project would contribute up to 250 MW of the total of 24,000 MW, or 1.0 percent. This comprises an insignificant portion of the total; insufficient reliability of GSEP would be unlikely to adversely impact SCE's ability to serve its load.

Foreseeable Renewable Projects in the California and Arizona Desert

Numerous solar, wind power and geothermal projects are foreseeable in the deserts of California and Arizona. The GSEP project would contribute up to 250 MW of the total of 24,000 MW, or 1.0 percent. This comprises an insignificant portion of the total; insufficient reliability of GSEP would be unlikely to adversely impact SCE's ability to serve its load when combined with the adverse effect of other projects within the SCE system.

D.4.9 COMPLIANCE WITH LORS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

D.3.10 NOTEWORTHY PUBLIC BENEFITS

This project would help serve the need for renewable energy in California, as most of the electricity generated would be produced by a reliable source of energy that is available during the hot summer afternoons, when power is needed most.

D.3.11 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification are proposed.

D.3.12 CONCLUSIONS

The applicant predicts an equivalent availability factor of 96-98 percent, which staff believes is achievable. Based on a review of the proposal, staff concludes that the plant would be built and operated in a manner consistent with industry norms for reliable operation. No conditions of certification are proposed.

D.3.13 REFERENCES

GSEP 2009a – Genesis Solar Energy Project/T. Bernhardt (tn:53083) Application for Certification for the Genesis Solar Energy Project. 08/31/2009

McGraw-Hill 1994—McGraw-Hill Energy Information Services Group. 1994. *Operational Experience in Competitive Electric Generation*. Executive Report.

NERC 2007—North American Electric Reliability Corporation. 2007. *2002–2006 Generating Availability Report*.

D.5- TRANSMISSION SYSTEM ENGINEERING

Testimony of Sudath Arachchige and Mark Hesters

D.5.1 SUMMARY OF CONCLUSIONS

The proposed interconnecting facilities including the Genesis Solar Energy Project (GSEP) 230 kV switchyard, the generator 230 kV overhead tie line and termination to the proposed Southern California Edison (SCE) Colorado River 500/230kV substation are adequate and in accordance with industry standards and good utility practices, and are acceptable to staff according to engineering Laws, Ordinances, Regulations and Standards (LORS).

The Phase I Interconnection Study (Phase I Study) does not provide a meaningful forecast of the transmission reliability impacts of the GSEP. The Phase I Study analyzed the impacts of 9,690 MW of generation in the GSEP cluster; however, after a December 2009 milestone most of the generation dropped out of the interconnection process and only 2,200 MW remained. Staff expects that the reliability impacts of 2,200 MW would be significantly smaller than the impacts of 9,690 MW. The California Independent System Operator (California ISO) Phase II Interconnection Study (Phase II Study) will be performed based on the 2,200 MW in the GSEP cluster, which includes the GSEP. The Phase II Study will not be available until early 2010. Staff intends to include the results of the Phase II study in a Supplemental Staff Assessment for the GSEP.

The GSEP would, therefore, meet the requirements and standards of all applicable LORS upon satisfactory compliance of the proposed TSE Conditions of Certification.

D.5.2 INTRODUCTION

The Transmission System Engineering (TSE) analysis examines whether or not the facilities associated with the proposed interconnection conforms to all applicable LORS required for safe and reliable electric power transmission. Staff's analysis evaluates the power plant switchyard, outlet line, termination and downstream facilities identified by the applicant. Additionally, under the California Environmental Quality Act (CEQA), the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (California Code of Regulations, title 14, §15378). Therefore, the Energy Commission must identify the system impacts and necessary new or modified downstream transmission facilities (beyond the first point of the proposed interconnection) that are required for interconnection and represent the "whole of the action." The downstream network upgrade mitigation measures that will be required to maintain system reliability for the addition of the power plant, are used to identify the requirement for any additional CEQA analysis for potential indirect impacts.

According to the previous guidelines, staff relied on the System Impact Study (SIS) and Facility Study (FS) as well as the review of these studies by the agencies responsible for ensuring the adjacent interconnecting grid meets reliability standards. The proposed GSEP would interconnect to the SCE transmission network and requires analysis by

SCE and approval by the California ISO. However, the California ISO's generator interconnection study process under the new Large Generator Interconnection Process (LGIP) Tariff is in transition from a queue or serial process to a cluster window process and now uses Phase I and Phase II Studies. The Phase I Study is similar to the former SIS except it is now performed for a group of projects in the same geographical area of a utility that apply for interconnection in the same request window. The Phase II Study is performed after generators in each cluster meet specific milestones required to stay in the generator interconnection queue. The Phase II Study is then performed based on those generators left in the queue. The interconnection studies analyze the effect of the proposed project on the ability of the transmission network to meet reliability standards (California ISO 2009a).

SCE'S ROLE

SCE is responsible for ensuring electric system reliability in the SCE system for addition of the proposed generating plant. SCE will provide the analysis and reports in their Phase I and Phase II Studies, and their approval for the facilities and changes required in the SCE system for addition of the proposed transmission modifications.

CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and is also responsible for developing the standards necessary to achieve system reliability. The California ISO is responsible for completing the studies of the SCE system to ensure adequacy of the proposed transmission interconnection. The California ISO will determine the reliability impacts of the proposed transmission modifications on the SCE transmission system in accordance with all applicable reliability criteria. According to the California ISO Tariff, the California ISO will determine the "Need" for transmission additions or upgrades downstream from the interconnection point to ensure reliability of the transmission grid. The California ISO will, therefore, review the Phase I Study performed by SCE and/or any third party provide their analysis, conclusions and recommendations. Upon completion of the SCE Phase II Study based on the expected mid-2013 commercial operation date (COD) or current COD the California ISO would execute Large Generator Interconnection Agreement (LGIA) between the California ISO and the project owner. If necessary, the California ISO may provide written and verbal testimony on their findings at the Energy Commission hearings.

D.5.3 LAWS, ORDINANCES, REGULATIONS AND STANDARDS

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), "Rules for Overhead Electric Line Construction," formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance and operation or use of overhead electric lines and to the public in general.
- California Public Utilities Commission (CPUC) General Order 128 (GO-128), "Rules for Construction of Underground Electric Supply and Communications Systems," formulates uniform requirements and minimum standards to be used for underground supply systems to ensure adequate service and safety to persons

engaged in the construction, maintenance and operation or use of underground electric lines and to the public in general.

- The National Electric Safety Code, 1999 provides electrical, mechanical, civil and structural requirements for overhead electric line construction and operation.
- NERC/WECC Planning Standards: The Western Electricity Coordinating Council (WECC) Planning Standards are merged with the North American Electric Reliability Council (NERC) Planning Standards and provide the system performance standards used in assessing the reliability of the interconnected system. These standards require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. Certain aspects of the NERC/WECC standards are either more stringent or more specific than the NERC standards alone. These standards provide planning for electric systems so as to withstand the more probable forced and maintenance outage system contingencies at projected customer demand and anticipated electricity transfer levels, while continuing to operate reliably within equipment and electric system thermal, voltage and stability limits. These standards include the reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of the standards, “NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table” and on Section I.D, “NERC and WECC Standards for Voltage Support and Reactive Power”. These standards require that the results of power flow and stability simulations verify defined performance levels. Performance levels are defined by specifying the allowable variations in thermal loading, voltage and frequency, and loss of load that may occur on systems during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (loss of load or a single transmission element out of service) to a level that seeks to prevent system cascading and the subsequent blackout of islanded areas during a major disturbance (such as loss of multiple 500 kV lines along a common right of way, and/or multiple generators). While controlled loss of generation or load or system separation is permitted in certain circumstances, their uncontrolled loss is not permitted (WECC 2006).
- North American Reliability Council (NERC) Reliability Standards for the Bulk Electric Systems of North America provide national policies, standards, principles and guidelines to assure the adequacy and security of the electric transmission system. The NERC Reliability Standards provide for system performance levels under normal and contingency conditions. With regard to power flow and stability simulations, while these Reliability Standards are similar to NERC/WECC Standards, certain aspects of the NERC/WECC Standards are either more stringent or more specific than the NERC Standards for Transmission System Contingency Performance. The NERC Reliability Standards apply not only to interconnected system operation but also to individual service areas (NERC 2006).
- California ISO Planning Standards also provide standards, and guidelines to assure the adequacy, security and reliability in the planning of the California ISO transmission grid facilities. The California ISO Grid Planning Standards incorporate the NERC/WECC and NERC Reliability Planning Standards. With regard to power flow and stability simulations, these Planning Standards are similar to the

NERC/WECC or NERC Reliability Planning Standards for Transmission System Contingency Performance. However, the California ISO Standards also provide some additional requirements that are not found in the WECC/NERC or NERC Standards. The California ISO Standards apply to all participating transmission owners interconnecting to the California ISO controlled grid. They also apply when there are any impacts to the California ISO grid due to facilities interconnecting to adjacent controlled grids not operated by the California ISO (California ISO 2002a).

- California ISO/FERC Electric Tariff provides guidelines for construction of all transmission additions/upgrades (projects) within the California ISO controlled grid. The California ISO determines the "Need" for the proposed project where it will promote economic efficiency or maintain system reliability. The California ISO also determines the Cost Responsibility of the proposed project and provides an Operational Review of all facilities that are to be connected to the California ISO grid (California ISO 2007a).

D.5.4 PROJECT DESCRIPTION

D.5.4.1 SETTING AND EXISTING CONDITIONS

The GSEP will consist of two independent concentrated solar electric generating facilities with a nominal net electrical output of 125 MW each, for a total net electrical output of 250MW. The auxiliary load for each generator would be 20MW, resulting in a maximum net output of 250MW at an 85 percent power factor. The project's planned operational date is summer of 2013. Each generating unit would be connected to the low side of its dedicated 13.8/230kV generator step-up (GSU) transformer through 15kV, 8000A isolated phase bus duct and an 8000A circuit breaker. The step-up transformer for the steam turbine generating unit would be rated at 13.8/230kV and 90/120/150 MVA at 65 centigrade. The 230kV side of the step-up transformer would be connected through a 1200A disconnect switch to the new Genesis 230kV switchyard. The plant will use parabolic through solar thermal technology to produce electrical power using steam turbine generators (STG) fed from solar steam generators (SSG). The SSG receives heated heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.
(GSEP project, 2009b section 3.0, pages 3-8 to 3-9 and Figure 3.4-7). Please see the **Project Description** section of this document for associated graphs and depictions.

SWITCHYARD AND INTERCONNECTION FACILITIES

The project will interconnect to the proposed SCE Colorado River 230/500kV substation as the primary point of interconnection. The plant site switchyard will be located near the unit two power block, and will require an overhead 795 kcmil, steel-reinforced, aluminum conductor unit tie line to interconnect the GSU transformers of each unit. The switchyard will be designed with a ring bus configuration and consist of three breakers and three line take off structures. The power from the switchyard will be transmitted through a generator tie line that will be routed in a southeasterly ROW eventually connecting to the proposed Southern California Edison 230/500kV Colorado River substation. The 230kV single circuit transmission line will be constructed with 795 kcmil, steel-reinforced, aluminum conductor with a continuous ampacity rating of approximately 906 Amps per conductor or 1816 Amps per bundle. The generator tie line

will travel in a southeasterly direction to a point where it will cross the existing Imperial Irrigation District's Blythe to Eagle-Mountain 161 kV transmission line. From the I-10 crossing, the generator tie line will continue south, where it will eventually intersect with the Blythe Energy Project Transmission (BEPTL) line. From that point, the generator tie line will travel east and share a portion of the double circuit transmission poles with the BEPTL where it will eventually terminate at the interconnection point within the proposed Colorado River substation. Each circuit will be supported by mono-pole structures at approximately 800 feet intervals with final heights as determined during detailed design (GSEP project, 2009a section 3.11, page 3-71 and figure 3.4-7 and, 3.6-1, 3.6-2).

D.5.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

For the interconnection of a proposed generating unit or transmission facility to the grid, the interconnecting utility and the control area operator are responsible for ensuring grid reliability. For the GSEP, SCE and the California ISO are responsible for ensuring grid reliability.

The California ISO's generator interconnection study process is in transition from a serial process to an interconnection window cluster study process. The GSEP was studied under the window cluster process and the transmission reliability impacts of the proposed project are studied in the Phase I and Phase II Studies. The Phase I Study is similar to the former System Impact Study except it is now performed for a group of projects in the same geographical area of a utility that apply for interconnection in the same request window. The Phase II Study is performed after generators in each cluster meet specific milestones required to stay in the generator interconnection queue. The Phase II Study is then performed based on the number of generators left in each cluster.

The Phase I Studies for projects in the transition cluster were conducted to determine the preferred and alternative generator interconnection methods and to identify any mitigation measures required to ensure system conformance with utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. Staff relies on the studies and any review conducted by the responsible agencies to determine the effect of the projects on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards (NERC2006, WECC 2006, California ISO 2002a, 2007a & 2009a).

The Phase I Study analyzes the grid with and without the generator or generators in a cluster under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds by which grid reliability is determined. The studies must analyze the impact of the projects for their proposed first year(s) of operation and thus are based on a forecast of loads, generation and transmission. Load forecasts are developed by the interconnected utility, which would be SCE in this case. Generation and transmission forecasts are based on the interconnection queue. The studies are focused on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and

transmission system, voltage collapse, loss of loads or cascading outages), short circuit duties and substation evaluation

Under the new California ISO LGIP, generators are able to choose between either “full capacity” or “energy only” depending on whether or not the generator wants to have the right to generate energy 24-hours per day. A generator that chooses the full capacity option will be required to pay for transmission network upgrades that are needed to allow the generator to operate under virtually any system conditions and as such could sign contracts that allowed them to provide capacity to utilities. Energy only generators would not pay for network transmission upgrades, and essentially would have access to as available transmission capacity, and would likely not be able to sign capacity contracts.

If the studies show that the interconnection of the project or cluster of projects causes the grid to be out of compliance with reliability standards, the study will then identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. If the interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions which require CEQA review as part of the “whole of the action,” the Energy Commission must analyze those modifications or additions according to CEQA requirements. Where the Phase I Study identifies transmission modifications required for the reliable interconnection of a cluster of generators, staff will analyze the proposed generating project’s impact on individual reliability criteria violations to determine whether or not the identified mitigation measures are a reasonably foreseeable consequence of the proposed project.

D.5.4.3 SCOPE OF THE TRANSITION CLUSTER PHASE 1 INTERCONNECTION STUDY

The July 28, 2009, Transition Cluster Phase I Study was prepared by the California ISO in coordination with SCE. The Phase I Study includes 15 queue generation projects in the Eastern Riverside County area totaling 9,690 MW net generation output, including the proposed 250 MW GSEP. As of December 4, 2009 only five projects (2,200 MW) of the original 15 projects remain in the interconnection queue. Reducing the size of the cluster by 10 projects and 7,490 MW means the Phase I Study results no longer provide a reasonable forecast of the reliability impacts of the proposed project or the other projects in the cluster. Since the Transition Cluster Phase I Study does not provide an accurate forecast of the reliability impacts of the cluster or the proposed GSEP, staff cannot rely on the study results to show project compliance with LORS and identify the transmission facilities required to reliably interconnect a generator to the existing transmission grid.

CEQA requires the analysis of reasonably foreseeable consequences of proposed projects based on the best available information. The California ISO is the reliability authority for generator interconnections and its Phase I Study for the GSEP provides the best available information on the reliability impacts of the proposed project. However, the significant reduction in the number of generators studied in the cluster with the GSEP reduces the study results to idle speculation. It is not possible to determine the impacts of the proposed project or even the cluster of generators because the size of the cluster has decreased so dramatically. The revised 2,200 MW

cluster will be analyzed in the Phase II Study and will provide a much better forecast of the reliability impacts of the GSEP and its associated cluster of generators.

The Phase II Study for the Transition Cluster is currently scheduled to be completed by early July of 2010. Staff intends to incorporate the results of the Phase II Study into a Supplemental Staff Assessment. If the Phase II Study finds that the GSEP and the remaining projects in its cluster would require the construction or upgrade of transmission facilities in order to maintain grid reliability, those transmission facilities would require a license from the California Public Utilities Commission or other permitting authority. Staff anticipates that future clusters will likely include fewer generators and the Phase I Studies which are not part of the Transition Cluster will provide less speculative study results and a better forecast of the reasonably foreseeable transmission impacts of a specific generator.

D.5.4.4 CEQA Level of Significance

Generally staff relies on the California ISO Phase I /System Impact Study to determine whether or not the proposed generation project will likely comply with reliability and to identify the transmission facilities required for reliable interconnection. For the Transition Cluster projects the Phase I Study does not provide an accurate forecast of impacts of the GSEP on the SCE transmission grid. The transmission upgrades identified in the Phase I Study are not reasonably foreseeable consequences of the proposed generating project. Relying on available information, staff is unable to identify any likely indirect project transmission impacts. Upon completion of the Phase II Study and the execution of the LGIA, the impacts of the GSEP on grid reliability will be identified. In order to ensure compliance with reliability LORS, Condition of Certification TSE-5 requires the submittal of the Phase II Study and the executed LGIA prior to the start of construction of transmission facilities (2009d, Phase I Interconnection Study report).

D.5.4.4.1 DOWNSTREAM FACILITIES

The Phase II Study will determine what, if any, downstream reliability upgrades outside the existing substation fence lines will be needed to accommodate the proposed GSEP. The study will include the California ISO's approved transmission projects in the SCE east of Lugo area network. The California Public Utilities Commission would be the lead agency for the CEQA analysis of any downstream transmission facilities identified in the Phase II Study. Major facilities would require a Certificate of Public Convenience and Necessity (CPCN) and any facilities impacting federal lands could also require an environmental analysis consistent with the National Environmental Policy Act.

D.5.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be Unit 1 of the proposed project, including a 125 MW solar facility located within the boundaries of the proposed project as defined by NextEra. This alternative is analyzed for two major reasons: (1) it eliminates about 50 percent of the proposed project area so all impacts are reduced, and (2) by eliminating the eastern solar field, it would reduce the water required for wet cooling by 50 percent. The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**.

D.5.5.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates effects to the eastern 125 MW solar field and relocates the gas yard approximately 1.75 miles northwest of its present location. As a result, the environmental setting consists of the western portion of the proposed project, as well as the area affected by the linear project components.

D.5.5.2 Assessment of Impacts and Discussion of Mitigation

A smaller, 125 MW, project would likely have fewer impacts on existing transmission facilities than the proposed project but these impacts would be identified through the California ISO's LGIP.

D.5.5.3 CEQA Level of Significance

As stated above, the Reduced Acreage Alternative is evaluated in this SA/DEIS because it would reduce some impacts of the project. Additionally, the Reduced Acreage Alternative would allow the applicant to contribute clean, renewable energy to help meet the State's energy goals, while minimizing impacts to the desert environment.

D.5.6 DRY COOLING ALTERNATIVE

This section identifies the potential impacts of using air-cooled condenser (ACC) systems rather than the cooling towers proposed by NextEra for the Genesis project. It is assumed that the ACC systems would be located where the cooling towers are currently proposed for each of the two 125 MW power block, as illustrated in **Alternatives Figure 2** (see Section B.3).

Approximately 18 ACC fans would be required for each of the two solar fields. The 18 fans, or ACC's, would operate when the ambient temperature is above 50 degrees Fahrenheit. When the temperature is below 50 degrees Fahrenheit, only 10 of the fans would be used (GSEP 2009f). The 18 ACC fans described in the GSEP cooling study would have a length of approximately 279 feet, a width of approximately 127 feet, and a height of 98 feet (GSEP 2009f). However, based on the ACC preliminary designs for nearby solar thermal projects in similar ambient temperatures, an additional 11,690 square feet could be required for siting of the fans and the fans would be up to 120 feet in height. In addition to the ACC fans, NextEra would use a small Wet Surface Air Cooler when needed to provide auxiliary cooling during extremely hot days (GSEP 2009f). This alternative is analyzed because it would reduce the amount of water required for steam turbine cooling from 822 acre-feet per year (AFY) to 66 AFY. This reduction in water use would reduce impacts to water and biological resources.

D.5.6.1 Setting and Existing Conditions

This alternative is located entirely within the boundaries of the proposed project. It simply eliminates the use of wet-cooling towers and incorporated the use of air-cooled condensers (ACC) in the same location. As a result, the environmental setting would be the same as for the proposed project.

D5.6.2 Assessment of Impacts and Discussion of Mitigation

The use of dry cooling would not affect the impacts of the GSEP on the reliability of the electric transmission network. If the use of dry cooling reduced the generation from the plant the impacts on the transmission network could be reduced as well.,

D.5.6.3 CEQA Level of Significance

No new impacts to Transmission System Engineering would be created with use of ACCs in place of cooling towers. The overall impact of the project with dry cooling would be similar to that of the proposed project. .

D.5.7 NO PROJECT/NO ACTION ALTERNATIVES

D.5.7.1 NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on Genesis Solar Energy Project application and on California Desert Conservation Area land use plan amendment

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC and BLM, and BLM would not amend the California Desert Conservation Area (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 ground disturbance. Because the project would not be built, the proposed interconnection would not be required and no impacts to safe and reliable electric power transmission would occur. However, the land on which the project is proposed would become available for 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

D.5.7.2 NO PROJECT/NO ACTION ALTERNATIVE #2:

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

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 will be developed with another solar technology. The different solar technology would require a transmission line and laws, ordinances, regulations, and standards required for safe and

reliable electric power transmission would be similar to those under the proposed project.

D.5.7.3 NO PROJECT/NO ACTION ALTERNATIVE #3:

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

Under this alternative, the proposed Genesis Solar Energy Project would not be approved by the CEC 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 so no solar projects can be approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no construction of a solar facility. Therefore, the proposed transmission line would not be required and no impacts to safe and reliable electric power transmission would occur. 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.

D.5.8 CUMULATIVE IMPACTS

Staff has reviewed the lists of existing and foreseeable projects as presented in the Cumulative Scenario section of this SA/DEIS. Staff's review considers whether the interconnection of GSEP to SCE's transmission system along with other existing and foreseeable generation projects would conform to all LORS required for safe and reliable electric power transmission. The analysis described above under the heading Proposed Project - Scope of System Impact Studies is conducted in coordination with, and the approval of, the California ISO to consider existing and proposed generator interconnections to the transmission grid and their potential safety and reliability impacts under a number of conservative contingency conditions.

The cumulative marginal impacts to the safe and reliable operation of the transmission system due to the GSEP project, as identified in the Phase II Study, would be mitigated with the Energy Commission's and BLM's incorporation of the mitigation measures and COC's set forth in this section.

D.5.9 COMPLIANCE WITH LORS

The proposed interconnection facilities including the GSEP 230 kV switchyard, generator 230 kV overhead tie line to the new SCE Genesis 230 kV substation and its termination at the new 230 kV substation are adequate in accordance with industry standards and good utility practices, and are acceptable to staff according to engineering LORS.

The Phase I Study results were found very speculative and inaccurate due to inclusion of 9,690 MW cluster generation projects including the GSEP. The Phase II Study would be performed with only 2,200 MW active cluster generation projects including the GSEP.

Consequently after execution of the LGIA with the applicant, the California ISO/SCE would proceed through the California Public Utility Commission's Certificate of Public Convenience and Necessity (CPCN) permit process for construction of facilities, which would include necessary CEQA analysis.

The GSEP would, therefore, meet the requirements and standards of all applicable LORS upon satisfactory compliance of the proposed TSE Conditions of Certification.

D.5.10 PROPOSED CONDITIONS OF CERTIFICATIONS/MITIGATION MEASURES

TSE-1 The project owner shall furnish to the CPM and to the CBO a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.

Verification: Prior to the start of construction, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in Table 1: Major Equipment List below). Additions and

deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

Table 1: Major Equipment List
Breakers
Step-up transformer
Switchyard
Busses
Surge arrestors
Disconnects
Take-off facilities
Electrical control building
Switchyard control building
Transmission pole/tower
Grounding system

TSE-2 Before the start of construction, the project owner shall assign to the project an electrical engineer and at least one of each of the following:

a) a civil engineer;

b) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering;

c) a design engineer who is either a structural engineer or a civil engineer and fully competent and proficient in the design of power plant structures and equipment supports; or

d) a mechanical engineer (Business and Professions Code Sections 6704 et seq. require state registration to practice as either a civil engineer or a structural engineer in California).

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers as long as each engineer is responsible for a particular segment of the project, e.g., proposed earthwork, civil structures, power plant structures, or equipment support. No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer. The civil, geotechnical, or civil and design engineer, assigned as required by Facility Design Condition **GEN-5**, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the CBO, for review and approval, the names, qualifications, and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earth work and require changes; if site conditions are unsafe or do not conform with the predicted conditions used as the basis for design of earth work or foundations.

The electrical engineer shall:

1. be responsible for the electrical design of the power plant switchyard, outlet, and termination facilities; and

2. sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: Prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (2001 California Building Code, Chapter 1, section 108.4, approval required; Chapter 17, section 1701.3, *Duties and Responsibilities of the Special Inspector;* Appendix Chapter 33, section 3317.7, *Notification of Noncompliance*). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and refer to this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for the disapproval, along with the revised corrective action required to obtain the CBO's approval.

TSE-4 For the power plant switchyard, outlet line and termination, the project owner shall not begin any construction until plans for that increment of construction have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the monthly compliance report:

a) receipt or delay of major electrical equipment;

b) testing or energization of major electrical equipment; and

c) the number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: Prior to the start of each increment of construction, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations for equipment and systems of the power plant switchyard, and outlet line and termination, including a copy of the signed and stamped statement from the responsible electrical engineer verifying compliance with all applicable LORS, and send the CPM a copy of the transmittal letter in the next monthly compliance report.

TSE-5 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS, and

the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations, as determined by the CBO.

a) The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC) and related industry standards.

b) Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

c) Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

d) The project conductors shall be sized to accommodate the full output of the project.

e) Termination facilities shall comply with applicable SCE interconnection standards.

f) The project owner shall provide to the CPM:

   i) The Special Protection System (SPS) sequencing and timing if applicable,

   ii) A letter stating that the mitigation measures or projects selected by the transmission owners for each reliability criteria violation, for which the project is responsible, are acceptable,

   iii) The final Phase II Interconnection Study, including a description of facility upgrades, operational mitigation measures, and/or special protection system sequencing and timing if applicable; and

   iv) A copy of the executed LGIA signed by the California ISO and the project owner.

Verification: Prior to the start of construction of transmission facilities (or fewer days if mutually agreed upon by the project owner and CBO), the project owner shall submit to the CBO for approval:

a) Design drawings, specifications, and calculations conforming with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, CA ISO standards, National Electric Code (NEC) and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment;

b) For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst case conditions"[1] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC), and related industry standards;

c) Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in charge, a route map, and an engineering description of the equipment and configurations covered by requirements **TSE-5** a) through f), above;

d) The Special Protection System (SPS) sequencing and timing if applicable shall be provided concurrently to the CPM.

e) A letter stating that the mitigation measures or projects selected by the transmission owners for each reliability criteria violation, for which the project is responsible, are acceptable,

f) The final Phase II Interconnection Study, including a description of facility upgrades, operational mitigation measures, and/or special protection system sequencing and timing if applicable, and

g) A copy of the executed LGIA signed by the California ISO and the project owner.

TSE-6 The project owner shall inform the CPM and CBO of any impending changes that may not conform to requirements **TSE-5** a) through f), and have not received CPM and CBO approval, and request approval to implement such changes. A detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change shall accompany the request. Construction involving changed equipment or substation configurations shall not begin without prior written approval of the changes by the CBO and the CPM.

Verification: Prior to the construction of transmission facilities, the project owner shall inform the CBO and the CPM of any impending changes that` may not conform to requirements of **TSE-5** and request approval to implement such changes.

TSE-7 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California Transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. The project owner shall contact the California ISO Outage Coordination Department, Monday through Friday, between the hours of 0700 and 1530 at (916) 351-2300 at least one business day prior to synchronizing the facility with the grid for testing. A report of conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-8 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC, Title 8, CCR, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", applicable interconnection standards, NEC and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

a) "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", and applicable interconnection standards, NEC, related industry standards, and these conditions shall be provided concurrently.

b) An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "Compliance Monitoring Plan".

c) A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge.

D.5.11 CONCLUSIONS

1. The proposed interconnection facilities including the GSEP 230 kV switchyard, generator 230 kV overhead tie line and termination at the proposed SCE Colorado River 230 kV are adequate, in accordance with industry standards and good utility practices, and are acceptable to staff according to engineering LORS.

2. The Phase I Study does not provide a meaningful forecast of the transmission reliability impacts of the GSEP. The Phase I Study analyzed the impacts of 9,690 MW of generation in the GSEP cluster; however, after a December 2009 milestone most of the generation dropped out of the interconnection process and only 2,200 MW remained. Staff expects that the reliability impacts of 2,200 MW would be significantly smaller than the impacts of 9,690 MW. The California ISO Phase II Study will be performed based on the 2,200 MW in the GSEP cluster, which includes the GSEP. The Phase II Study for the Transition Cluster is currently scheduled to be completed by early July of 2010. Staff intends to incorporate the results of the Phase II Study into a Supplemental Staff Assessment. Consequently after completion of the Phase II Study and execution of the LGIA with applicant, the California ISO/SCE would proceed through the California Public Utilities Commission's CPCN permit process for construction of facilities, which would include necessary CEQA analysis.

3. The GSEP would, therefore, meet the requirements and standards of all applicable LORS upon satisfactory compliance of the proposed TSE Conditions of Certification.

4. The GSEP, as local solar generation, would provide clean renewable energy towards meeting state mandate and goals.

D.5.12 REFERENCES

California ISO (California Independent System Operator) 1998a. California ISO Tariff Scheduling Protocol posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator) 1998b. California ISO Dispatch Protocol posted April 1998.

California ISO (California Independent System Operator) 2002a. California ISO Planning Standards, February 7, 2002.

California ISO (California Independent System Operator) 2007a. California ISO, FERC Electric Tariff, First Replacement Vol. No. 1, March, 2007.

California ISO 2009a - California Independent System Operator, Large Generator Interconnection Procedures, dated 8/18/2009.

GSEP 2009b: Genesis Solar Energy Project. Application for Certification (AFC) for the GSEP, Submitted on 08-30-2009.

CA ISO Transition cluster Phase 1 Interconnection Study Report dated August 05, 2009. Submitted on 10-09.

NERC (North American Electric Reliability Council) 2006. Reliability Standards for the Bulk Electric Systems of North America, May 2 2006.

WECC (Western Electricity Coordinating Council) 2006. NERC/WECC Planning Standards, August 2006.

D.5.13 DEFINITION OF TERMS

AAC All aluminum conductor

ACSR Aluminum conductor steel-reinforced

ACSS Aluminum conductor steel-supported

Ampacity Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations

Ampere The unit of current flowing in a conductor

Bundled Two wires, 18 inches apart

Bus Conductors that serve as a common connection for two or more circuits

Conductor The part of the transmission line (the wire) that carries the current.

Congestion Management
A scheduling protocol that ensures dispatched generation and transmission loading (imports) will not violate criteria

Double Contingency
Also known as emergency or N-2 condition, occurs when a forced outage of two system elements occurs -- usually (but not exclusively) caused by one single event. Examples of an N-2 contingency include loss of two transmission circuits on single tower line or loss of two elements connected by a common circuit breaker due to the failure of that common breaker

Emergency Overload
See Single Contingency condition. This is also called an N-1.

Kcmil or KCM
Thousand circular mil. A unit of the conductor's cross sectional area; when divided by 1,273, the area in square inches is obtained.

Kilovolt (kV)
A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground

Loop An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection, and returns it back to the interrupted circuit, thus forming a loop or cul de sac

Megavar One megavolt ampere reactive

Megavars Mega-volt-ampere-reactive. One million volt-ampere-reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system

Megavolt Ampere (MVA)
A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, divided by 1,000

Megawatt (MW)
A unit of power equivalent to 1,341 horsepower

N-0 Condition
See Normal Operation/Normal Overload, below

Normal Operation/ Normal Overload (N-0)
When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating

N-1 Condition
See Single Contingency, below

N-2 Condition
See Double Contingency, above

Outlet Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities with the main grid

Power Flow Analysis
A power flow analysis is a forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels

Reactive Power
Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system

Remedial Action Scheme
A remedial action scheme is an automatic control provision that, as one example, will trip a selected generating unit when a circuit overloads

SF6 Sulfur hexafluoride is an insulating medium

Single Contingency
Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service

Solid Dielectric Cable
Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket

Special Protection Scheme/System
Detects a transmission outage (either a single or credible multiple contingency) or an overloaded transmission facility and then trips or runs back generation output to avoid potential overloaded facilities or other criteria violations

Switchyard A power plant switchyard is an integral part of a power plant that is used as an outlet for one or more electric generators

Thermal Rating See ampacity.

TSE Transmission System Engineering

Tap A transmission configuration that creates an interconnection through a short single circuit to a small or medium-sized load or generator. The new single circuit line is inserted into an existing circuit by utilizing breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.

Undercrossing
A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

E - GENERAL CONDITIONS INCLUDING COMPLIANCE MONITORING AND CLOSURE PLAN

Testimony of Mary Dyas

E.1 INTRODUCTION

The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated, and closed in compliance with public health and safety, environmental, and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission and specified in the written decision on the Application for Certification or otherwise required by law. The Public Resources Code section 25806(d), states that renewable energy projects are exempt from paying an annual compliance fee.

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission approved conditions of certification;
- establish requirements for facility closure plans; andspecify conditions of certification for each technical area containing the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure below a level of significance. Each specific condition of certification also includes a verification provision that describes the method of assuring that the condition has been satisfied.

In addition to meeting the Energy Commission's Conditions of Certification, the project owner will be required to comply with all terms and conditions required by the Bureau of Land Management (BLM), as will be described in the BLM's Record of Decision and Right-of-Way Grant documents for this project.

E.2 DEFINITIONS

The following terms and definitions are used to establish when Conditions of Certification are implemented.

PRE-CONSTRUCTION SITE MOBILIZATION

Site mobilization is limited preconstruction activities at the site to allow for the installation of fencing, construction trailers, construction trailer utilities, and construction trailer parking at the site. Limited ground disturbance, grading, and trenching associated with the above mentioned pre-construction activities is considered part of site mobilization. Walking, driving or parking a passenger vehicle, pickup truck and/or light vehicles is allowable during site mobilization.

CONSTRUCTION

Onsite work to install permanent equipment or structures for any facility.

Ground Disturbance

Construction-related ground disturbance refers to activities that result in the removal of top soil or vegetation at the site beyond site mobilization needs, and for access roads and linear facilities.

Grading, Boring, and Trenching

Construction-related grading, boring, and trenching refers to activities that result in subsurface soil work at the site and for access roads and linear facilities, e.g., alteration of the topographical features such as leveling, removal of hills or high spots, moving of soil from one area to another, and removal of soil.

Notwithstanding the definitions of ground disturbance, grading, boring, and trenching above, construction does **not** include the following:

1. the installation of environmental monitoring equipment;
2. a soil or geological investigation;
3. a topographical survey;
4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and
5. any work to provide access to the site for any of the purposes specified in “Construction” 1, 2, 3, or 4 above.

START OF COMMERCIAL OPERATION

For compliance monitoring purposes, “commercial operation” begins after the completion of start-up and commissioning, when the power plant has reached reliable steady-state production of electricity at the rated capacity. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager.

E.3 COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

The Compliance Project Manager (CPM) shall oversee the compliance monitoring and is responsible for:

1. ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Energy Commission Decision;

2. resolving complaints;

3. processing post-certification changes to the conditions of certification, project description (petition to amend), and ownership or operational control (petition for change of ownership) (See instructions for filing petitions);

4. documenting and tracking compliance filings; and

5. ensuring that compliance files are maintained and accessible.

The CPM is the contact person for the Energy Commission and will consult with appropriate responsible agencies, Energy Commission, and staff when handling disputes, complaints, and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal required by a condition of certification requires CPM approval, the approval will involve all appropriate Energy Commission staff and management. All submittals must include searchable electronic versions (pdf or MS Word files).

E.4 CHIEF BUILDING OFFICIAL RESPONSIBILITIES

The Chief Building Official (CBO) shall serve as the Energy Commission's delegate to assure the project is designed and constructed in accordance with the Energy Commission's Decision including Conditions of Certification, California Building Standards Code, local building codes and applicable laws, ordinances, regulations and standards to ensure health and safety. The CBO is typically made-up of a team of specialists covering civil, structural, mechanical and electrical disciplines whose duties include the following:

1. Performing design review and plan checks of all drawings, specifications and procedures;

2. Conducting construction inspection;

3. Functioning as the Energy Commission's delegate including reporting noncompliance issues or violations to the CPM for action and taking any action allowed under the California Code of Regulations, including issuing a Stop Work Order, to ensure compliance;

4. Exercising access as needed to all project owner construction records, construction and inspection procedures, test equipment and test results; and

5. Providing weekly reports on the status of construction to the CPM.

PRE-CONSTRUCTION AND PRE-OPERATION COMPLIANCE MEETING

The CPM usually schedules pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings is to assemble both the Energy Commission's and project owner's technical staff to review the status of all pre-construction or pre-operation requirements contained in the Energy Commission's conditions of certification. This is to confirm that all applicable conditions of certification have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings ensure, to the extent possible, that Energy Commission conditions will not delay the construction and operation of the plant due to oversight and to preclude any last minute, unforeseen issues from arising. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

ENERGY COMMISSION RECORD

The Energy Commission shall maintain the following documents and information as a public record, in either the Energy Commission's Compliance file or Dockets file, for the life of the project (or other period as required):

- All documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;
- All monthly and annual compliance reports filed by the project owner;
- All complaints of noncompliance filed with the Energy Commission; and
- All petitions/requests for project or condition of certification changes and the resulting Energy Commission action.

E.5 PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that the compliance conditions of certification and all other conditions of certification that appear in the Commission Decision are satisfied. The compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, conditions of certification, or ownership. Failure to comply with any of the conditions of certification or the compliance conditions may result in reopening of the case and revocation of Energy Commission certification; an administrative fine; or other action as appropriate. A summary of the Compliance Conditions of Certification is included as **Compliance Table 1** at the conclusion of this section.

E.6 COMPLIANCE MITIGATION MEASURES/CONDITIONS OF CERTIFICATION

UNRESTRICTED ACCESS (COMPLIANCE-1)

The CPM, responsible Energy Commission staff, and delegated agencies or consultants shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on-site for the purpose of conducting audits, surveys, inspections, or general site visits. Although the CPM will

normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time.

COMPLIANCE RECORD (COMPLIANCE-2)

The project owner shall maintain project files on-site or at an alternative site approved by the CPM for the life of the project, unless a lesser period of time is specified by the conditions of certification. The files shall contain copies of all “as-built” drawings, documents submitted as verification for conditions, and other project-related documents.

Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

COMPLIANCE VERIFICATION SUBMITTALS (COMPLIANCE-3)

Each condition of certification is followed by a means of verification. The verification describes the Energy Commission’s procedure(s) to ensure post-certification compliance with adopted conditions. The verification procedures, unlike the conditions, may be modified as necessary by the CPM.

Verification of compliance with the conditions of certification can be accomplished by the following:

1. monthly and/or annual compliance reports, filed by the project owner or authorized agent, reporting on work done and providing pertinent documentation, as required by the specific conditions of certification;

2. appropriate letters from delegate agencies verifying compliance;

3. energy Commission staff audits of project records; and/or

4. energy Commission staff inspections of work, or other evidence that the requirements are satisfied.

Verification lead times associated with start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification.

A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. **The cover letter subject line shall identify the project by AFC number, the appropriate condition(s) of certification by condition number(s), and a brief description of the subject of the submittal**. The project owner shall also identify those submittals **not** required by a condition of certification with a statement such as: “This submittal is for information only and is not required by a specific condition of certification.” When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and CEC submittal number.

The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner.

All hardcopy submittals shall be addressed as follows:

Mary Dyas
Compliance Project Manager
09-AFC-8C
California Energy Commission
1516 Ninth Street (MS-2000)
Sacramento, CA 95814

Those submittals shall be accompanied by a searchable electronic copy, on a CD or by e-mail, as agreed upon by the CPM.

If the project owner desires Energy Commission staff action by a specific date, that request shall be made in the submittal cover letter and shall include a detailed explanation of the effects on the project if that date is not met.

PRE-CONSTRUCTION MATRIX AND TASKS PRIOR TO START OF CONSTRUCTION (COMPLIANCE-4)

Prior to commencing construction, a compliance matrix addressing only those conditions that must be fulfilled before the start of construction shall be submitted by the project owner to the CPM. This matrix will be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first. It will be submitted in the same format as the compliance matrix described below.

Construction shall not commence until the pre-construction matrix is submitted, all pre-construction conditions have been complied with, and the CPM has issued a letter to the project owner authorizing construction. Various lead times for submittal of compliance verification documents to the CPM for conditions of certification are established to allow sufficient staff time to review and comment and, if necessary, allow the project owner to revise the submittal in a timely manner. This will ensure that project construction may proceed according to schedule.

Failure to submit compliance documents within the specified lead-time may result in delays in authorization to commence various stages of project development.

If the project owner anticipates commencing project construction as soon as the project is certified, it may be necessary for the project owner to file compliance submittals prior to project certification. Compliance submittals should be completed in advance where the necessary lead time for a required compliance event extends beyond the date anticipated for start of construction. The project owner must understand that the submittal of compliance documents prior to project certification is at the owner's own risk. Any approval by Energy Commission staff is subject to change, based upon the Commission Decision.

Compliance Reporting

There are two different compliance reports that the project owner must submit to assist the CPM in tracking activities and monitoring compliance with the terms and conditions of the Energy Commission Decision. During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to the CPM in the monthly or annual compliance reports.

COMPLIANCE MATRIX (COMPLIANCE-5)

A compliance matrix shall be submitted by the project owner to the CPM along with each monthly and annual compliance report. The compliance matrix is intended to provide the CPM with the current status of all conditions of certification in a spreadsheet format. The compliance matrix must identify:

1. the technical area;
2. the condition number;
3. a brief description of the verification action or submittal required by the condition;
4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);
5. the expected or actual submittal date;
6. the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable;
7. the compliance status of each condition, e.g., “not started,” “in progress” or “completed” (include the date); and
8. if the condition was amended, the date of the amendment.

Satisfied conditions shall be placed at the end of the matrix.

MONTHLY COMPLIANCE REPORT (COMPLIANCE-6)

The first Monthly Compliance Report is due one month following the Energy Commission business meeting date upon which the project was approved, unless otherwise agreed to by the CPM. The first Monthly Compliance Report shall include the AFC number and an initial list of dates for each of the events identified on the **Key Events List. The Key Events List form is found at the end of these General Conditions.**

During pre-construction and construction of the project, the project owner or authorized agent shall submit an original and an electronic searchable version of the Monthly Compliance Report within 10 working days after the end of each reporting month.

Monthly Compliance Reports shall be clearly identified for the month being reported. The reports shall contain, at a minimum:

1. a summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;

2. documents required by specific conditions to be submitted along with the Monthly Compliance Report. Each of these items must be identified in the transmittal letter, as well as the conditions they satisfy and submitted as attachments to the Monthly Compliance Report;

3. an initial, and thereafter updated, compliance matrix showing the status of all conditions of certification;

4. a list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;

5. a list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;

6. a cumulative listing of any approved changes to conditions of certification;

7. a listing of any filings submitted to, or permits issued by, other governmental agencies during the month;

8. a projection of project compliance activities scheduled during the next two months. The project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;

9. a listing of the month's additions to the on-site compliance file; and

10. a listing of complaints, notices of violation, official warnings, and citations received during the month, a description of the resolution of the resolved actions, and the status of any unresolved actions.

All sections, exhibits, or addendums shall be separated by tabbed dividers or as acceptable by the CPM.

ANNUAL COMPLIANCE REPORT (COMPLIANCE-7)

After construction is complete, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to the CPM each year at a date agreed to by the CPM. Annual Compliance Reports shall be submitted over the life of the project, unless otherwise specified by the CPM. Each Annual Compliance Report shall include the AFC number, identify the reporting period, and shall contain the following:

1. an updated compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

2. a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;

3. documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter with the condition it satisfies, and submitted as attachments to the Annual Compliance Report;

4. a cumulative listing of all post-certification changes approved by the Energy Commission or cleared by the CPM;

5. an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

6. a listing of filings submitted to, or permits issued by, other governmental agencies during the year;

7. a projection of project compliance activities scheduled during the next year;

8. a listing of the year's additions to the on-site compliance file;

9. an evaluation of the on-site contingency plan for unplanned facility closure, including any suggestions necessary for bringing the plan up to date (see Compliance Conditions for Facility Closure addressed later in this section); and

10. a listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved matters, and the status of any unresolved matters.

CONFIDENTIAL INFORMATION (COMPLIANCE-8)

Any information that the project owner deems confidential shall be submitted to the Energy Commission's Executive Director with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501, et. seq.

REPORTING OF COMPLAINTS, NOTICES, AND CITATIONS (COMPLIANCE-9)

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints, or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering with a date and time stamp recording. All recorded complaints shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to the CPM who will post it on the Energy Commission's web page at http://www.energy.ca.gov/sitingcases/power_plants_contacts.html.

Any changes to the telephone number shall be submitted immediately to the CPM, who will update the web page.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).

E.7 FACILITY CLOSURE

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

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

CLOSURE DEFINITIONS

Planned Closure

A planned closure occurs when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

Unplanned Temporary Closure

An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency.

Unplanned Permanent Closure

An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unplanned closure where the owner implements the on-site contingency plan. It can also include unplanned closure where the project owner fails to implement the contingency plan, and the project is essentially abandoned.

E.8 COMPLIANCE CONDITIONS FOR FACILITY CLOSURE

PLANNED CLOSURE (COMPLIANCE-10)

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the CPM) prior to the commencement of closure activities. The project owner shall file 120 copies (or other number of copies agreed upon by the CPM) of a proposed facility closure plan with the Energy Commission.

The plan shall:

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

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

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

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

Prior to submittal of the proposed facility closure plan, a meeting shall be held between the project owner and the Energy Commission CPM for the purpose of discussing the specific contents of the plan.

In the event that there are significant issues associated with the proposed facility closure plan's approval, or if the desires of local officials or interested parties are inconsistent with the plan, the CPM shall hold one or more workshops and/or the Energy Commission may hold public hearings as part of its approval procedure.

As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until the Energy Commission approves the facility closure plan.

UNPLANNED TEMPORARY CLOSURE/ON-SITE CONTINGENCY PLAN (COMPLIANCE-11)

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

necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.

The project owner shall submit an on-site contingency plan for CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation. The approved plan must be in place prior to commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with the CPM, will update the on-site contingency plan as necessary. The CPM may require revisions to the on-site contingency plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the on-site contingency plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by the CPM.

The on-site contingency plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by the CPM, the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also see specific conditions of certification for the technical areas of **Hazardous Materials Management** and **Waste Management**)

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

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

If the CPM determines that an unplanned temporary closure is likely to be permanent, or for a duration of more than 12 months, a closure plan consistent with the requirements for a planned closure shall be developed and submitted to the CPM within 90 days of the CPM's determination (or other period of time agreed to by the CPM).

UNPLANNED PERMANENT CLOSURE/ON-SITE CONTINGENCY PLAN (COMPLIANCE-12)

The on-site contingency plan required for unplanned temporary closure shall also cover unplanned permanent facility closure. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure.

In addition, the on-site contingency plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment.

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

A closure plan, consistent with the requirements for a planned closure, shall be developed and submitted to the CPM within 90 days of the permanent closure or another period of time agreed to by the CPM.

POST CERTIFICATION CHANGES TO BLM'S ROW GRANT AND/OR THE ENERGY COMMISSION DECISION: AMENDMENTS, OWNERSHIP CHANGES, STAFF APPROVED PROJECT MODIFICATIONS AND VERIFICATION CHANGES (COMPLIANCE-13)

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the project (including linear facilities) design, operation or performance requirements, and to transfer ownership or operational control of the facility. **It is the responsibility of the project owner to contact the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769.** Implementation of a project modification without first securing Energy Commission, or Energy Commission staff approval, may result in enforcement action that could result in civil penalties in accordance with section 25534 of the Public Resources Code.

A petition is required for **amendments** and for **staff approved project modifications** as specified below. Both shall be filed as a "Petition to Amend." Staff will determine if the change is significant or insignificant. For verification changes, a letter from the project owner is sufficient. In all cases, the petition or letter requesting a change should be submitted to the CPM, who will file it with the Energy Commission's Dockets Unit in accordance with Title 20, California Code of Regulations, section 1209.

The criteria that determine which type of approval and the process that applies are explained below. They reflect the provisions of Section 1769 at the time this condition was drafted. If the Commission's rules regarding amendments are amended, the rules in effect at the time an amendment is requested shall apply.

Amendment

The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, Section 1769(a), when proposing modifications to the project (including linear facilities) design, operation, or performance requirements. If a proposed modification results in deletion or change of a condition of certification, or makes changes that would cause the project not to comply with any applicable laws, ordinances, regulations, or standards the petition will be processed as a formal amendment to the final decision, which requires public notice and review of the Energy

Commission staff analysis and approval by the full Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(a). Upon request, the CPM will provide a sample petition to use as a template.

Change of Ownership

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769 (b). This process requires public notice and approval by the full Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(b). Upon request, the CPM will provide a sample petition to use as a template.

Staff Approved Project Modification

Modifications that do not result in deletions or changes to conditions of certification, that are compliant with laws, ordinances, regulations and standards and will not have significant environmental impacts may be authorized by the CPM as a staff approved project modification pursuant to section 1769(a) (2). Once staff files an intention to approve the proposed project modifications, any person may file an objection to staff's determination within 14 days of service on the grounds that the modification does not meet the criteria of section 1769 (a)(2). If a person objects to staff's determination, the petition must be processed as a formal amendment to the decision and must be approved by the full commission at a noticed business meeting or hearing.

Verification Change

A verification may be modified by the CPM without requesting an amendment to the decision if the change does not conflict with the conditions of certification and provides an effective alternate means of verification.

E.9 CBO DELEGATION AND AGENCY COOPERATION

In performing construction and operation monitoring of the project, Energy Commission staff acts as, and has the authority of, the Chief Building Official (CBO). Energy Commission staff may delegate CBO responsibility to either an independent third party contractor or the local building official. Energy Commission staff retains CBO authority when selecting a delegate CBO, including enforcing and interpreting state and local codes, and use of discretion, as necessary, in implementing the various codes and standards.

Energy Commission staff may also seek the cooperation of state, regional, and local agencies that have an interest in environmental protection when conducting project monitoring.

E.10 ENFORCEMENT

The Energy Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the

Energy Commission Decision. The specific action and amount of any fines the Energy Commission may impose would take into account the specific circumstances of the incident(s). This would include such factors as the previous compliance history, whether the cause of the incident involves willful disregard of LORS, oversight, unforeseeable events, and other factors the Energy Commission may consider.

ENERGY COMMISSION NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1237, but in many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by future law or regulations.

Informal Dispute Resolution Process

The following procedure is designed to informally resolve disputes concerning the interpretation of compliance with the requirements of this compliance plan. The project owner, the Energy Commission, or any other party, including members of the public, may initiate an informal dispute resolution process. Disputes may pertain to actions or decisions made by any party, including the Energy Commission's delegate agents.

This process may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237, but is not intended to be a substitute for, or prerequisite to it. This informal procedure may not be used to change the terms and conditions of certification as approved by the Energy Commission, although the agreed upon resolution may result in a project owner, or in some cases the Energy Commission staff, proposing an amendment.

The process encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a dispute cannot be resolved, then the matter must be brought before the full Energy Commission for consideration via the complaint and investigation procedure.

Request for Informal Investigation

Any individual, group, or agency may request the Energy Commission to conduct an informal investigation of alleged noncompliance with the Energy Commission's terms and conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of a request for an informal investigation, the CPM shall promptly notify the project owner of the allegation by telephone and letter. All known and relevant information of the alleged noncompliance shall be provided to the project owner and to the Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If the CPM finds that further investigation is necessary, the project owner will be asked to promptly investigate the matter. Within seven working days of the CPM's request, provide a written report to the CPM of the

results of the investigation, including corrective measures proposed or undertaken. Depending on the urgency of the noncompliance matter, the CPM may conduct a site visit and/or request the project owner to also provide an initial verbal report, within 48 hours.

Request for Informal Meeting

In the event that either the party requesting an investigation or the Energy Commission staff is not satisfied with the project owner's report, investigation of the event, or corrective measures proposed or undertaken, either party may submit a written request to the CPM for a meeting with the project owner. Such request shall be made within 14 days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

1. immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;

2. secure the attendance of appropriate Energy Commission staff and staff of any other agencies with expertise in the subject area of concern, as necessary;

3. conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner;

4. After the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum that fairly and accurately identifies the positions of all parties and any understandings reached. If an agreement has not been reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1230, et. seq.

Formal Dispute Resolution Procedure-Complaints and Investigations

Any person may file a complaint with the Energy Commission's Dockets Unit alleging noncompliance with a Commission decision adopted pursuant to Public Resources Code section 25500. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1237.

KEY EVENTS LIST

PROJECT: _____

DOCKET #: _____

COMPLIANCE PROJECT MANAGER: _____

EVENT DESCRIPTION	DATE
Certification Date	
Obtain Site Control	
Online Date	
POWER PLANT SITE ACTIVITIES	_____
Start Site Mobilization	
Start Ground Disturbance	
Start Grading	
Start Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Combustion of Gas Turbine	
Obtain Building Occupation Permit	
Start Commercial Operation	
Complete All Construction	
TRANSMISSION LINE ACTIVITIES	_____
Start T/L Construction	
Synchronization with Grid and Interconnection	
Complete T/L Construction	
FUEL SUPPLY LINE ACTIVITIES	_____
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	_____
Start Water Supply Line Construction	
Complete Water Supply Line Construction	

COMPLIANCE TABLE 1
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-1	Unrestricted Access	The project owner shall grant Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.
COMPLIANCE-2	Compliance Record	The project owner shall maintain project files on-site. Energy Commission staff and delegate agencies shall be given unrestricted access to the files.
COMPLIANCE-3	Compliance Verification Submittals	The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed or the project owner or his agent.
COMPLIANCE-4	Pre-construction Matrix and Tasks Prior to Start of Construction	Construction shall not commence until the all of the following activities/submittals have been completed: • property owners living within one mile of the project have been notified of a telephone number to contact for questions, complaints or concerns, • a pre-construction matrix has been submitted identifying only those conditions that must be fulfilled before the start of construction, • all pre-construction conditions have been complied with, • the CPM has issued a letter to the project owner authorizing construction.
COMPLIANCE-5	Compliance Matrix	A compliance matrix shall be submitted by the project owner to the CPM along with each monthly and annual compliance report
COMPLIANCE-6	Monthly Compliance Report including a Key Events List	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due the month following the Energy Commission business meeting date on which the project was approved and shall include an initial list of dates for each of the events identified on the Key Events List.

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-7	Annual Compliance Reports	After construction ends and throughout the life of the project, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.
COMPLIANCE-8	Confidential Information	Any information the project owner deems confidential shall be submitted to the Energy Commission's Executive Director with a request for confidentiality.
COMPLIANCE-9	Reporting of Complaints, Notices, and Citations	Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints, or concerns
COMPLIANCE-10	Planned Facility Closure	The project owner shall submit a closure plan to the CPM at least 12 months prior to commencement of a planned closure.
COMPLIANCE-11	Unplanned Temporary Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.
COMPLIANCE-12	Unplanned Permanent Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned permanent closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.
COMPLIANCE-13	Post-certification changes to the Decision	The project owner must petition the Energy Commission to delete or change a condition of certification, modify the project design or operational requirements and/or transfer ownership of operational control of the facility.

ATTACHMENT 1
COMPLAINT REPORT / RESOLUTION FORM

Complaint Log Number:_____ Docket Number:_____

Project Name:_____

COMPLAINTANT INFORMATION

Name:_____ Phone Number:_____

Address:_____

COMPLAINT

DATE COMPLAINT RECEIVED:_____ TIME COMPLAINT RECEIVED:_____

COMPLAINT RECEIVED BY: ☐ TELEPHONE ☐ IN WRITING (COPY ATTACHED)

DATE OF FIRST OCCURRENCE:_____

DESCRIPTION OF COMPLAINT (INCLUDING DATES, FREQUENCY, AND DURATION):_____

_____

_____

FINDINGS OF INVESTIGATION BY PLANT PERSONNEL:_____

_____

_____

DOES COMPLAINT RELATE TO VIOLATION OF A CEC REQUIREMENT? ☐ YES ☐ NO

DATE COMPLAINTANT CONTACTED TO DISCUSS FINDINGS:_____

DESCRIPTION OF CORECTIVE MEASURES TAKEN OR OTHER COMPLAINT RESOLUTION:_____

_____

_____

DOES COMPLAINTANT AGREE WITH PROPOSED RESOLUTION? ☐ YES ☐ NO

IF NOT, EXPLAIN:_____

_____

CORRECTIVE ACTION

IF CORRECTIVE ACTION NECESSARY, DATE COMPLETED:_____

DATE FIRST LETTER SENT TO COMPLAINTANT (COPY ATTACHED):_____

DATE FINAL LETTER SENT TO COMPLAINTANT (COPY ATTACHED):_____

OTHER RELEVANT INFORMATION:_____

_____

_____

"This information is certified to be correct."

PLANT MANAGER SIGNATURE:_____ DATE:_____

F. LIST OF PREPARERS

GENESIS SOLAR ENERGY PROJECT
LIST OF PREPARERS

Executive Summary ..... Mike Monasmith

Introduction ..... Mike Monasmith

Proposed Project and Alternatives ..... Mike Monasmith, Susan V. Lee

Cumulative Scenario ..... Susan V. Lee

Air Quality ..... Joseph Hughes and William Walters, P.E.

Biological Resources .. Heather Blair, Carolyn Chainey-Davis, Amy Golden, Sara Keeler, Mark Massar, Susan Sanders

Hazardous Materials Management ..... Alvin Greenberg, Ph.D.

Health and Safety ..... Alvin Greenberg, Ph.D.

Land Use, Recreation, and Wilderness ..... Negar Vahidi

Noise and Vibration ..... Erin Bright

Soils and Water Resources ..... A. Collison M. Daly, Michael Donovan, John Thornton

Traffic and Transportation ..... Candace Hills

Transmission Line Safety and Nuisance ..... Obed Odoemelam, Ph.D.

Visual Resources ..... James Jewel, William Walters, William Kanemoto

Waste Management ..... James Thurber

Worker Safety and Fire Protection ..... Alvin Greenberg, Ph.D.

Facility Design ..... Shahab Koshmashrab

Geology, Paleontology and Minerals ..... Dal Hunter, Ph.D., CEG.

Power Plant Efficiency ..... Shahab Koshmashrab

Power Plant Reliability ..... Shahab Koshmashrab

Transmission System Engineering ..... Mark Hesters, Sudath Edirisuriya

General Conditions ..... Mary Dyas

Project Assistant ..... .Maria Santourdjian

G. WITNESS QUALIFICATIONS AND DECLARATIONS

DECLARATION OF
Mike Monasmith

I**,** Mike Monasmith, declare as follows:

1. I am presently employed by the California Energy Commission in its Siting, Transmission and Environmental Protection Division as a Senior Project Manager.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Executive Summary** and **Project Description** sections of the **Revised Staff Assessment** for the **Genesis Solar Energy Project** Application for Certification (AFC), based on my independent analysis of the AFC, supplements, data, documents, analysis and testimony from other staff and reliable sources, and based upon my own professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 11, 2010 Signed: _____

At: Sacramento, California

J. MIKE MONASMITH

3308 Hunnicutt Lane
Sacramento, CA 95821
916-412-8589

WORK HISTORY:

CALIFORNIA ENERGY COMMISSION, Sacramento
Siting, Transmission & Environmental Protection
Project Manager (2007 – present) --

CALIFORNIA ENERGY COMMISSION, Sacramento
Associate Public Adviser (2003 - 2007) --

CALIFORNIA RESOURCES AGENCY, Sacramento
Special Assistant to the Secretary, Policy & Planning (2003) --

CALIFORNIA DEMOCRATIC PARTY, Los Angeles
Director of Communications (2002) --
Coordinated Campaign, Gore/Lieberman Deputy Director (2000) --
Press Secretary, Coordinated Campaign, Californians for Feinstein (1994) --

U.S. CONGRESSWOMAN JANE HARMAN, Washington DC
Chief of Staff (1997 - 1998) --
Deputy Campaign Manager, Harman for Governor (1998) --
Political Director (2001) --

STATE CONTROLLER KATHLEEN CONNELL, Los Angeles
Chief Deputy Controller (2000 - 2001) --
Assistant Deputy Controller, External Affairs (1995 - 1996) --

VERIZON COMMUNICATIONS, Thousand Oaks, CA
Director, Los Angeles Government Affairs (1999 - 2000) --
Company's Registered Lobbyist for L.A. City Council / L.A. Board of Supervisors

U.S. DEPARTMENT OF THE INTERIOR, Washington DC
Special Assistant, Assistant Secretary for Water & Science, (1997) --

CLINTON/GORE '96 GENERAL COMMITTEE, Los Angeles
California Deputy State Director (Southern California Political Lead) (1996)
California Desk Co-Director, Presidential Inaugural Committee (1997)

SHEILA JAMES KUEHL FOR ASSEMBLY, Los Angeles
Campaign Manager / Candidate Spokesman (1994)

LOS ANGELES MAYOR RICHARD RIORDAN, Los Angeles
Deputy Press Secretary / Mayoral Assistant / Advance Co-Lead (1993-94)
Deputy Field Director / Deputy Director, Advance (**Riordan for Mayor** 1993)

DEMOCRATIC PARTY OF ORANGE COUNTY, Santa Ana
Office Manager / Chief Assistant, Chairman Adler (1991-92)

UNIVERSITY OF CALIFORNIA, Santa Cruz
Federal Work-study Program Manager, UCSC Student Employment (1990 – 1991)

ICICLE SEAFOODS, Inc., Seward, AK
Production Supervisor, Towa Eggroom (Summers, 1988-1991)

EDUCATION:

University of California at Santa Cruz (College VIII)
B.A., Environmental Studies/Politics (Policy & Planning)**,** 1990
(Thesis Honors: Resource Management, Tongass National Forest, Alaska)

DECLARATION OF
Susan V. Lee

I, **Susan V. Lee**, declare as follows:

1. I am presently employed by Aspen Environmental Group as a Senior Associate, under contract with the California Energy Commission to prepare the Alternatives analysis and to develop the Cumulative Impact scenario.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Alternatives** and the **Cumulative Impact scenario** for the **Genesis Solar Energy Project Revised Staff Assessment**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/5/10 Signed: Susan Lee

At: San Francisco, CA

SUSAN V. LEE

Vice President, San Francisco Operations

ACADEMIC BACKGROUND

M.S., Applied Earth Science, Stanford University, 1984
B.A., Geology, Oberlin College, 1977

PROFESSIONAL EXPERIENCE

Ms. Lee has over 25 years of technical and managerial experience in environmental assessment, and she currently manages Aspen's San Francisco Office. Her expertise is in management of environmental assessment for infrastructure and energy projects (renewable energy projects, electric transmission lines, pipelines, and gas-fired power plants) under both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Ms. Lee has managed preparation of several major controversial transmission line and pipeline siting EIR/EISs, including the Sunrise Powerlink, Path 15, Jefferson-Martin, Tri-Valley, and Devers–Palo Verde No. 2. Prior to employment at Aspen, Ms. Lee worked for 10 years with the Federal government [the U.S. Minerals Management Service (MMS) and the U.S. Geological Survey (USGS)].

Ms. Lee has worked for Aspen Environmental Group since 1993. She has contributed to both technical and project management aspects of Aspen's environmental projects, including the following:

- **California Energy Commission**. Ms. Lee has supported CEC staff since the fall of 2000. To date, she has prepared analyses for 14 power plants throughout the State, and she has also contributed to several special project reports. She has participated in numerous public workshops and hearings around the state, and completed the CEC's Expert Witness Training. Her major efforts for the CEC include the following:
  - Ms. Lee is managing the Alternatives and Cumulative impact analyses for several solar thermal projects on public lands, coordinating NEPA issues with BLM staff and CEQA issues with the Energy Commission's Project Manager.
  - Ms. Lee managed preparation of the CEC's first comprehensive dry cooling analysis for a coastal power plant using once-through cooling, the **Morro Bay Power Plant Modernization Project**. She managed a team of authors who developed a preliminary cooling design, and provided impact analysis.
  - Ms. Lee has prepared staff assessment **Alternatives Analyses** (consistent with CEQA and the CEC's procedures) for the CEC's staff reports considering proposed new or re-powered power plants at South Bay (San Diego), Blythe (BEP II), Morro Bay, El Segundo, Avenal, San Joaquin Valley, Potrero Unit 7 (San Francisco), Tracy, East Altamont, Henrietta, and the San Francisco Electric Reliability Project. She also prepared the alternatives analysis for the CEC's Blythe Transmission Modifications Project. In addition to preparing staff assessment sections documenting comparative impacts of alternatives, this work includes making presentations at PSA Workshops and testifying at Evidentiary Hearings.
  - Ms. Lee managed a three-year transmission corridor modeling project, **Planning Alternative Corridors for Transmission (PACT)**, in conjunction with the CEC PIER Environmental Program. The model uses Geographic Information Systems and decision modeling to assist in comparing potential alternative transmission corridors. Aspen's work included overall contract management, as well as development and management of a Project Steering Committee and six Technical Advisory Groups.
  - Ms. Lee prepared a detailed Background Report and made a presentation at an Energy Commission workshop on "**Comparative Alternatives to Transmission**" as part of the Integrated Energy Policy Report (IEPR) 2004 Update process. This project evaluated non-wires alternatives to transmission lines;

ongoing work is related to development of a methodology for consideration of these alternatives as part of the transmission planning process.

- Ms. Lee served as the CEC's **Project Manager** for the Small Power Plant Exemption (SPPE) environmental review process for the Woodland Generation Station 2, an 80-megawatt power plant proposed by the Modesto Irrigation District.
- Ms. Lee managed preparation of **Power Plant Cooling Options Reports** for the Potrero Unit 7 Project, Morro Bay, SMUD Cosumnes, and El Segundo power plants. These analyses include conceptual design of dry cooling systems, hybrid cooling systems, and water supply options including use of reclaimed water in both once through and hybrid cooling systems.
- Ms. Lee has provided management and technical support to Aspen's preparation of several reports for the CEC: the Environmental Performance Report, the Coastal Power Plant Study, and the Alternative Generation Technology study.

- **California Valley Solar Ranch EIR.** Under contract to San Luis Obispo County, Ms. Lee is managing preparation of an EIR to evaluate development of a 250 MW solar photovoltaic power facility on nearly 4,000 acres in the Carrizo Plain.
- **SDG&E Sunrise Powerlink Transmission Project EIR/EIS**. Under a $14 million contract to the CPUC, and under a Memorandum of Understanding with the Bureau of Land Management (BLM), Ms. Lee managed preparation of an EIR/EIS for a highly controversial 150-mile transmission line from Imperial County to coastal San Diego County.
- **SCE Devers–Palo Verde No. 2 Transmission Line Project EIR/EIS**. Under contract to the CPUC, Ms. Lee managed preparation of an EIR/EIS to evaluate the impacts of a constructing a 230-mile 500 kV transmission line between the Palo Verde generating hub in Arizona and SCE's Devers Substation.
- **Long-Term Procurement Planning and Barriers to Renewable Power Implementation**. For the CPUC, Ms. Lee and a team of environmental and economic specialists developed environmental and economic data and developed timelines of permitting and barriers to implementing the proposed 33 percent Renewable Portfolio Standard, including ranking and screening of available energy resources.
- **Jefferson-Martin 230 kV Transmission Line Project**. Ms. Lee managed preparation of an EIR for PG&E's proposed 27-mile transmission line through scenic San Mateo County in the Highway 280 corridor, urban Colma and Daly City, and across San Bruno Mountain for the California Public Utilities Commission (CPUC).
- **PG&E Northeast San Jose Transmission Reinforcement Project**: Ms. Lee served as the Project Manager for this CPUC contract to evaluate PG&E's proposed transmission improvements in Santa Clara and Alameda Counties.
- **PG&E Tri-Valley 2002 Capacity Increase Project.** Ms. Lee managed preparation of the Draft and Final EIRs for this controversial and complex project during 2000 and 2001, which was certified by the CPUC in May 2001. The Draft EIR (over 800 pages) evaluated proposed transmission lines and substations in the Tri-Valley area (Cities of Pleasanton, Dublin, Livermore, and San Ramon) of Alameda and Contra Costa Counties, and responded to a high level of local concern regarding electric and magnetic fields (EMFs).

DECLARATION OF
Joseph Hughes

I, Joseph Hughes declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering and Corridor Designation Office of the Siting, Transmission and Environmental Protection Division as an Air Resources Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony and errata on **Air Quality** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata are valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 11, 2010 Signed: Joseph Hughes

At: Sacramento, California

Joseph Hughes

Education

Sacramento State University 2003-2008
Sacramento, Ca

Bachelor of Science, Mechanical Engineering Technology, 3.25GPA*-May 2008*

AA degree in liberal arts and science 3.0 GPA

Experience

California Energy Commission March 2009-Present
Sacramento, Ca

Air Resources Engineer

- Currently co-authoring air quality staff assessments for thermal power plant projects in California producing more than 50 mega-watts of electricity.
- Currently working on American Recovery and Reinvestment Act (ARRA) projects, along with natural gas fired projects.
- Review and process compliance reports for multiple power plants in California.
- Currently working on project amendments and modifications requiring air quality analysis.
- Trained in CEQA and NEPA analysis, along with AERMOD air modeling.

Capital Engineering Consultants, Inc April 2008-2009
Sacramento, Ca

Mechanical Engineer

- Responsible for detailed and accurate take off calculations to ensure successful project completion.
- Completing engineering design for Heating Ventilation Air Conditioning and Plumbing by utilizing complex engineering calculations and software.
- Responsible for meeting code regulation and requirements to the degree acceptable by various organizations.
- Lead productive weekly team meetings to discuss project scheduling, cost effectiveness, request for information, and change orders.

DECLARATION OF
Testimony of William Walters, P.E.

I, **William Walters,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission's Siting,Transmission and Environmental Protection Division, as a senior associate in engineering and physical sciences.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Air Quality** and **Greenhouse Gases** for the **Genesis Solar Energy Project** (09-AFC-8) **Revised Staff Assessment** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: May 20, 2010 Signed: _____

At: Agoura Hills, California

DECLARATION OF
William Walters, P.E

I, **William Walters** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission in the Siting, Transmission and Environmental Protection Division as a **Senior Associate in Engineering and Physical Sciences**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Plume Velocity Analysis** for the Genesis Solar Energy Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 6, 2010 Signed: _____

At: Sacramento, California

WILLIAM WALTERS, P.E.
Air Quality Specialist

ACADEMIC BACKGROUND
B.S., Chemical Engineering, 1985, Cornell University

PROFESSIONAL EXPERIENCE

Mr. Walters has over 20 years of technical and project management experience in environmental compliance work, including environmental impact reports, emissions inventories, source permitting, energy and pollution control research RCRA/CERCLA site assessment and closure, site inspection, and source monitoring,.

Aspen Environmental Group 2000 to present

Responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- **Engineering and Environmental Technical Assistance to Conduct Application for Certification Review for the California Energy Commission:**
  - Preparation and project management of the air quality section of the Staff Assessment and/or Initial Study and the visual plume assessment for the following California Energy Commission (CEC) licensing projects: Hanford Energy Park; United Golden Gate, Phase I; Huntington Beach Modernization Project (including Expert Witness Testimony); Woodland Generating Station 2; Ocotillo Energy Project, Phase I; Magnolia Power Project; Colusa Power Project; Inland Empire Energy Center; Rio Linda/Elverta Power Plant Project; Roseville Energy Center; Henrietta Peaker Project; Tracy Peaking Power Plant Project (including Expert Witness Testimony); Avenal Energy Project; San Joaquin Valley Energy Center (including expert witness testimony); Salton Sea Unit 6 Project (including expert witness testimony); Modesto Irrigation District Electric Generation Station (including expert witness testimony); Walnut Energy Center (including expert witness testimony); Riverside Energy Resource Center (including expert witness testimony); Pastoria Energy Facility Expansion; Panoche Energy Center; Starwood Power Plant; and Riverside Energy Resource Center Units 3 and 4 Project (in progress).
  - Preparation and project management of the visual plume assessment for the following California Energy Commission (Energy Commission) licensing projects: Metcalf Energy Center Power Project (including Expert Witness Testimony); Contra Costa Power Plant Project (including Expert Witness Testimony); Mountainview Power Project; Potrero Power Plant Project; El Segundo Modernization Project; Morro Bay Power Plant Project; Valero Cogeneration Project; East Altamont Energy Center (including expert witness testimony); Russell City Energy Center; SMUD Cosumnes Power Plant Project (including expert witness testimony); Pico Power Project; Blythe Energy Project Phase II; City of Vernon Malburg Generating Station; San Francisco Electric Reliability Project; Los Esteros Critical Energy Facility Phase II; Roseville Energy Park; City of Vernon Power Plant; South Bay Replacement Project; Walnut Creek Energy Park; Sun Valley Energy Project; Highgrove Power Plant; Colusa Generating Station; Russell City Energy Center; Avenal Energy Project; Carlsbad Energy Center; Community Power Project; Panoche Energy Center; San Gabriel Generating Station; Sentinel Energy Project; and Victorville 2 Hybrid Power Project.
  - Assistance in the aircraft safety review of thermal plume turbulence for the Riverside Energy Resources Center; Russell City Energy Center Amendment (including expert witness testimony); Eastshore Energy Power Plant (including expert witness testimony); Carlsbad Energy Center (in progress), Riverside Energy Resource Center Units 3 and 4 Project; Victorville 2 Hybrid Power Project; and the Blythe Energy Power

Plant and Blythe Energy Project Phase II (including expert witness testimony) siting cases. Assistance in the aircraft safety review of thermal and visual plumes of the operating Blythe Energy Power Plant. Preparation of a white paper on methods for the determination of vertical plume velocity determination for aircraft safety analyses.

- Preparation and instruction of a visual water vapor plume modeling methodology class for the CEC.
- Preparation and project management of the public health section of the Initial Study for the Woodland Generating Station 2 Energy Commission licensing project.
- Preparation of project amendment or project compliance assessments, for air quality or visual plume impacts, for several licensed power plants, including: Metcalf Energy Center; Pastoria Power Plant; Elk Hills Power Plant; Henrietta Peaker Project; Tracy Peaker Project; Magnolia Power Project; Delta Energy Center; SMUD Cosumnes Power Plant; Walnut Energy Center; San Joaquin Valley Energy Center; City of Vernon Malburg Generating Station; Otay Mesa Power Plant; Los Esteros Critical Energy Facility; Pico Power Project; Riverside Energy Resource Center; Blythe Energy Project Phase II; Inland Empire Energy Center; Salton Sea Unit 6 Project; and Starwood Power-Midway Peaking Power Plant.
- Preparation of the air quality section of the staff paper "A Preliminary Environmental Profile of California's Imported Electricity" for the Energy Commission and presentation of the findings before the Commission.
- Preparation of the draft staff paper "Natural Gas Quality: Power Turbine Performance During Heat Content Surge", and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the staff paper "Emission Offsets Availability Issues" and preparation and presentation of the Emission Offsets Constraints Workshop Summary paper for the Energy Commission.
- Preparation of information request and data analysis to update the Energy Commission's Cost of Generation Model capital and operating cost factors for combined and simple cycle gas turbine projects. Additionally, performed a review of the presentation for the revised model as part of the CEC's 2007 Integrated Energy Policy Report workshops, and attended the workshop and answering Commissioner questions on the data collection and data analysis.

- For the **Los Angeles Department of Water and Power (LADWP)**:
  - Preparation of the Air Quality Inventory for the LADWP River Supply Pipeline Project EIR.
  - Project management and preparation of the Air Quality Section for the LADWP Valley Generating Station Stack Removal IS/MND support project.
- For the **U.S. Army Corps of Engineers (Corps)**:
  - Preparation of the Air Quality Section and General Conformity Analysis for the Matilija Dam Ecosystem Restoration Project EIS/R for the Corps.
  - Preparation of emission inventory and General Conformity Analysis of the Murrieta Creek Flood Control Project and the Joint Red Flag exercise to be conducted in the Nevada Test and Training Range.
  - Emission inventory for the construction activities forecast for the San Jose/Old San Jose Creeks Ecosystem Restoration project for the Corps.

- Other Projects:
  - Preparation of the Air Quality Section of the LAUSD New School Construction Program EIR and provided traffic trip and VMT calculation support for the Traffic and Transportation Section.

- Preparation of the draft staff paper "Natural Gas Quality: Power Turbine Performance During Heat Content Surge", and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the Air Quality Section of the Environmental Information Document in support of the Coastal Consistency Determinations for the suspension of operation requests for undeveloped units and leases off the Central California Coast.
- Preparation of comments on the Air Quality, Alternatives, Marine Traffic, Public Safety, and Noise section of the Cabrillo Port Liquefied Natural Gas Deepwater Port Draft EIS/EIR for the City of Oxnard.
- Preparation of the emission estimates used in the Air Quality Sections for the DWR Tehachapi Second Afterbay Project Initial Study and EIR.

Camp Dresser & McKee, Inc. 1998 to 2000

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Preparation of emission inventories and dispersion modeling for criteria and air toxic pollutants for the Los Angeles International Airport Master Plan (LAXMP) EIS/EIR.
- Project Manager/Technical lead for the completion of air permit applications and air compliance audits for two Desa International fireplace accessory manufacturing facilities located in Santa Ana, California.
- Project manager/technical lead for the completion of Risk Management Plans (RMPs) for four J.R. Simplot food processing facilities in Oregon, Idaho, and Washington and the Consolidated Reprographics facility located in Irvine, California.

Planning Consultants Research 1997 to 1998

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Project Manager for a stationary source emission audit of the entire Los Angeles International Airport complex for Los Angeles World Airports (LAWA) in support of the LAXMP.
- Review of the Emission Dispersion Modeling System (EDMS) and preparation of a report with findings to the Federal Aviation Administration for LAWA in support of the LAXMP.
- Project manager for the ambient air monitoring and deposition monitoring studies performed for LAWA in support of the LAXMP, including the selection of the monitoring sites and specialty subcontractor, and review of all monitoring data.

Aspen Environmental Group/Clean Air Solutions 1995 to 1996

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Manager of the Portland, Oregon, office of Clean Air Solutions from March 1995 to December 1995, with responsibilities including Project Management, Business Development, and Administration.
- Control technology assessment, engineering support and Notice of Intent to construct preparation for J.R. Simplot's Hermiston, Oregon, food processing facility. Review and revision of an Air Contaminant Discharge Permit application, Title V permit application, and PSD modeling analysis for J.R. Simplot's Hermiston facility.

- Air quality compliance report including an air emission inventory, regulation and permit compliance determination, and recommendations for compliance for Lumber Tech, Inc.'s Lebanon, Oregon, wood products facility.

Fluor Daniel, Inc. 1990 to 1995 and 1996 to 1997

Mr. Walters was responsible as lead technical or project manager for major environmental projects for both government and private clients. His projects included:

- Prepared several air permit applications for the ARCO Los Angeles Refinery Polypropylene Plant Project; Phase I environmental assessments for properties located in Southern California; and a site investigation and RCRA closure plan for a hazardous waste storage site in Vernon, California.
- Project manager of the Anaconda Smelter site for the U.S. Environmental Protection Agency's (EPA) Alternative Remedial Contract System (ARCS) project during the conclusion of technical activities and project closeout. Prepared a cost recovery report for the project.
- Performed environmental analysis for the Bonneville Power Authority, including air pollution BACT analysis, wastewater analysis, and evaluation of secondary environmental effects of electric power producing technologies.

Jacobs Engineering Group 1988 to 1990

Mr. Walters was responsible for a wide range of air pollution regulatory and testing projects, including the following:

- Project manager of air toxic emission inventory reports prepared for U.S. Borax's boron mining and refining facility and the Naval Aviation Depot (N. Island Naval Base, San Diego, California).
- Prepared air permit applications and regulatory correspondence for several facilities including the U.S. Department of Energy's Feed Material Production Center uranium processing facility in Fernald, Ohio; Evaluation of a sludge dewatering process at Unocal's Wilmington, California, Refinery; and United Airlines blade repair facility at the San Francisco Airport.
- Characterized and quantified air emissions for offshore oil and gas development activities associated with Federal oil and gas Lease Sale 95, offshore southern California, for the U.S. Minerals Management Service.

CERTIFICATIONS

- Chemical Engineer, California License 5973
- CARB, Fundamentals of Enforcement Seminar
- EPA Methods 1-8, 17; Training Seminar

AWARDS

- California Energy Commission Outstanding Performance Award 2001

DECLARATION OF
Heather Blair

I, Heather Blair, declare as follows:

1. I am presently employed as a consultant to the California Energy Commission in the Siting, Transmission and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Biological Resources** for the **Genesis Solar Energy Project** (09-AFC-8) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/10/10 Signed: Original signed by H. Blair

At: Sacramento, California

HEATHER BLAIR
Environmental Scientist

ACADEMIC BACKGROUND

M.S., Conservation Biology, Sacramento State University, In Progress
B.S., Ecology, San Diego State University, 2004

PROFESSIONAL EXPERIENCE

Heather Blair is an Environmental Scientist experienced in a range of natural resource investigations and environmental impact analysis including botanical and wildlife research, inventory, and survey techniques; technical writing; and data analysis. She has experience preparing environmental documents pursuant to applicable federal, state and local environmental regulations, including the California Environmental Quality Act, National Environmental Policy Act, and the California and federal Endangered Species Acts.

Aspen Environmental Group — 2004 to present

Selected project experience at Aspen includes the following:

Power Generation and Transmission Interconnection Projects

- **California Energy Commission.** Aspen has a multi-year contract to provide support to the Energy Facility Planning and Licensing Programs. Under this contract Ms. Blair has participated in the following projects:
  - **Biological Resources Assessment for the Abengoa Mojave Solar Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 250 MW power plant in the Mojave Desert. Important biological issues include impacts to Harper Dry Lake from potentially decreased water availability, desert tortoise, and Mojave ground squirrel.
  - **Biological Resources Assessment for the San Joaquin Solar 1&2 Hybrid Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 107 MW solar thermal/biomass hybrid power plant. Important biological issues include potential impacts to San Joaquin kit fox habitat and movement corridor connectivity.
  - **Biological Resources Assessment for the Genesis Solar Energy Project.** Ms. Blair is currently serving as the assistant technical staff for the analysis of impacts to biological resources from the 250 MW power plant in an undeveloped area of the Sonoran Desert. Important biological issues include direct and indirect (downstream) impacts to ephemeral drainages from site development and indirect impacts to sand dune dependent vegetation and wildlife communities from disruption of Aeolian processes.
  - **Biological Resources Assessment for the Carlsbad Energy Center.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 540 MW CECP. Important biological issues include potential impacts to Agua Hedionda Lagoon and consistency with the Carlsbad Habitat Management Plan. Ms. Blair recently testified as an expert witness in biological resources during Evidentiary Hearings before the Commission.
  - **Biological Resources Assessment for the CPV Sentinel Project.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 850 MW CPV Sentinel project. Important biological issues include potential impacts from groundwater drawdown to the mesquite hummock plant community and the special-status species it supports.
  - **Biological Resources Assessment for the CPV Vaca Station Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 660 MW CPVVS.

Important biological issues include potential impacts to giant garter snake from reduced flows in Old Almao Creek and loss of Swainson's hawk foraging habitat.

- **Biological Resources Assessments for the Marsh Landing and Willow Pass Generating Stations.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 930 MW MLGS and 550 MW WPGS. Important biological issues include potential indirect impacts to listed plant species in the Antioch Dunes National Wildlife Refuge from nitrogen deposition.
- **Biological Resources Assessments for the Panoche and Starwood Energy Centers.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 400 MW Panoche Energy Center and 120 MW Starwood Project. These projects required coordination with USFWS and CDFG regarding impacts to the State and federally listed San Joaquin kit fox.

- **Northern California CO2 Storage Pilot, Confidential Client, CEQA and NEPA compliance, (2008).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements and preparation of the Initial Statement under CEQA for the proposed CO_2 sequestration pilot test site in Montezuma Hills, California. Ms. Blair conducted focused nesting surveys of the State-threatened Swainson's hawk (*Buteo swansonii*).
- **Arizona Utilities CO_2 Storage Pilot, CEC and University of California, NEPA compliance, (2007).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements for the proposed CO_2 sequestration pilot test site near Joseph City, Arizona. Ms. Blair conducted focused surveys of the federally endangered Peebles Navajo cactus (*Pediocactus peeblesianus* var. *peeblesianus*).
- **Environmental Screening Tool for Out-of-State Renewables, KEMA and CEC, Staff (2009).** Assessed the potential for California laws, ordinance, regulations and standards to be impacted by out-of-state renewable facilities seeking RPS certification. Ms. Blair prepared the assessment of impacts associated with geothermal projects.
- **Nuclear Power Plant Assessment (Assembly Bill 1632).** Ms. Blair managed the preparation of and was a contributing author for a major Appendix to the Nuclear Power Plan Assessment Report for the Energy Commission. This report evaluated nuclear power issues in the state in response to recent legislation (AB 1632), including environmental issues associated with alternatives (including renewable) to the state's two nuclear facilities.
- **Diablo Canyon Power Plant Steam Generator Replacement Project.** Ms. Blair supported the management team in preparing the project description, alternatives and supporting sections of the Draft and Final EIR.

<u>Transmission Line and Substation Projects</u>

- **Sunrise Powerlink Transmission Line Project.** Under contract to the California Public Utilities Commission (CPUC), Aspen prepared an EIR/EIS for a 150-mile proposed transmission line from Imperial Valley Substation, near El Centro, California, to Peñasquitos Substation in northwestern San Diego County. The Proposed Project would potentially deliver renewable resources from the Imperial Valley via a 500 kV transmission line to a new 500/230 kV substation, and from the new substation to western San Diego via 230 kV overhead and underground transmission lines. Ms. Blair analyzed the impacts to wilderness and recreation. Additionally, she wrote the project description and assisted with overall project support.
- **TANC Transmission Project.** Aspen was awarded a contract with the Transmission Agency of Northern California (TANC) for CEQA/NEPA and environmental permitting support for 600-miles of proposed 500 and 230 kV transmission lines between Lassen County and Santa Clara County, California. The project included evaluation of over 600 additional miles of alternative routes, six new substations, and modifications to six existing substations. Ms. Blair was the Deputy Project Manager, responsible for coordinating the biological and cultural resource field surveys. The project was cancelled in July 2009.

- **Sacramento Area Voltage Support Project.** Under contract to Western Area Power Administration (Western) and in cooperation with SMUD, Aspen prepared an SEIS and EIR for a double-circuit 230 kV circuit between Western's O'Banion/Sutter Power Plant and Elverta Substation/Natomas Substation. Ms. Blair was part of the project management team and managed the wetland delineation, Biological Survey Report, and Biological Evaluation.

- **North Area ROW Maintenance Project**. Under contract to Western, Ms. Blair is currently providing project support to prepare an Environmental Assessment and Operation and Maintenance Program associated with the operation and maintenance procedures along Western's transmission line ROWs between Sacramento (Sutter/Yuba County line) and the Oregon border. This project also includes a detailed survey of the biological and cultural resources along 434 miles of North Area ROW, 342 miles of COTP ROW, and several hundred miles of access and maintenance roads. Ms. Blair is working closely with project management and resource specialists to coordinate and execute over 800 miles of surveys. She conducted wildlife inventory and surveyed portions of ROW for sensitive species and recorded habitat types, jurisdictional waters and infrastructure using a Trimble GeoXT GPS unit. Additionally, Ms. Blair was integrally involved in the management and development of the North Area O&M GIS database.

- **Categorical Exclusions for Routine Operation and Maintenance.** Under contract to Western, Ms. Blair has prepared multiple CXs for routine maintenance activities along Western's CVP, PACI, and COTP transmission line ROWs and access roads. She has developed a streamlined and highly efficient system to use the results and analysis for the North Area ROW Maintenance Project to complete these documents.

- **GIS Data Verification and Resource Database Development for the Trinity County PUD Direct Interconnection Project.** Under contract to Western, Ms. Blair was the Deputy Project Manager for this project and also be coordinated and conducted biological resources in support of the development of an O&M GIS database, which included identification of sensitive resources and associated project conservation measures for this new segment of Western's CVP transmission system.

- **Seventh Standard Substation Project.** Under contract to the CPUC, Ms. Blair prepared the biological resource section of an Initial Study/Mitigated Negative Declaration for a proposed 4.9 acre 115/21 kV substation and transmission interconnection in northwest Bakersfield, Kern County, California. Important biological issues included impacts to the State and federally listed San Joaquin kit fox and western burrowing owl (a California species of special concern), as well as compliance with the Metropolitan Bakersfield Habitat Conservation Plan.

- **Atlantic–Del Mar Reinforcement Project Mitigated Negative Declaration**. Under contract to the CPUC, Ms. Blair served as an assistant environmental monitor during the construction of four miles of overhead transmission towers and lines and approximately 1.3 miles of underground lines. The project involved trenching, horizontal drilling and blasting and requires avoidance of several wetlands, seasonal pools and threatened and endangered species.

- **Miguel-Mission 230 kV #2 Project EIR Addendum**. Under contract to the CPUC, Ms. Blair helped to prepare a detailed addendum associated with engineering design changes for the Miguel-Mission 230 kV #2 Project.

<u>Other Infrastructure, Resource Management, and Monitoring Projects</u>

- **Hazardous Fuels and Vegetation Management for Angeles National Forest.** Under contract to the U.S. Forest Service, Ms. Blair conducted botanical and wildlife surveys at approximately 100 sites ranging from one to 2500 acres throughout the Angeles National Forest. Modifications to current fuel management practices were proposed in response to increased frequency and intensity of wildfire resulting from climate change. She prepared 75 Biological Evaluations/Biological Assessments that assessed the biological impacts of proposed fuel management practices throughout the forest.

- **Rare Plant Surveys for the East Branch Extension Pipeline Project.** Under contract to the Department of Water Resources, Ms. Blair conducted rare plant surveys of the endangered Santa Ana River wooly star (*Eriastrum densifolium* ssp. *sanctorum*) and the state and federally endangered slender horned spine flower (*Dodecahema leptoceras*) in response to the proposed construction of a water pipeline through San Bernardino and Riverside Counties.
- **Upper San Antonio Creek Watershed Giant Reed Removal Project.** Ms. Blair prepared the biological resource analysis of an Initial Study to remove invasive plant species from the Upper San Antonio Creek Watershed. Required field survey and development of impact avoidance measures for several special-status species, including California red-legged frog, southern steelhead, and riparian nesting birds.
- **Least Tern Monitoring for the Montezuma Slough Tidal Wetlands Restoration Project**. Under contract to EcoBridges Environmental, Ms. Blair monitored the nesting success of three nesting colonies of the federally and State endangered least tern. This effort involved counting and mapping the nest sites and tern chicks once a week for two years.
- **Endangered Species Monitoring for the Lomita Canal Vegetation Clearing Project**. Monitored the federally threatened California Red-legged frog and the state- and federally endangered San Francisco Giant Garter Snake during vegetation clearing activities along the Lomita Canal at the San Francisco International Airport. Involved identification of these species, relocation of California red-legged frogs, and re-direction of work in the event a SF Garter Snake was spotted.

PREVIOUS EXPERIENCE

Soil Ecology and Restoration Group ***January to May 2004***

Research Assistant. Ms. Blair assisted in managing the greenhouse where native seeds were germinated and propagated. In this role, she collected seeds from native plants and analyzed the composition of the soil present in their native habitat to ensure seedling viability. The plants were subsequently used in the restoration of degraded habitat as contracted by the U.S. Army Corps of Engineers and others.

DECLARATION OF
Carolyn Chainey-Davis

I**, Carolyn Chainey-Davis,** declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-05-002, I am serving as an Associate Biological Resource Specialist, Level II, to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Biological Resources** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 10, 2010 Signed: _____

At: Nevada City, California

Carolyn Chainey-Davis, botanist

Over 23 years experience conducting biological inventories and impact assessments, rare plant and noxious weed surveys, large-scale vegetation mapping, wetland delineations, large-scale watershed assessments, designing and implementing mitigation & monitoring plans, habitat management plans, and restoration plans throughout California. Ms. Chainey-Davis field experience includes a diverse group of clients and projects from large transmission and hydro relicensing projects to urban and residential development projects, local, state and federal agencies, resource conservation organizations, landfill and mine reclamation projects, and many more. She led Garcia and Associates (GANDA) botanical studies for numerous FERC relicensing projects (PG&E & SCE) including Stanislaus River, Upper North Fork Feather River, Pit River, Vermillion, Bucks Lake and Poe hydro-relicensing projects, Transmission Separation project, Lower Owens River riparian monitoring, and hundreds of other large and small projects around the state.

Ms. Davis is past President of the California Native Plant Society, Nevada and Placer County Chapter and is a co-author of the recently published field guide "*Wildflowers of Nevada and Placer Counties*", published by the California Native Plant Society. Ms. Davis completed her wetland training at Portland State University and is certified for conducting wetland delineations based on the U.S. Army Corps of Engineers Wetland Delineation Manual. Ms. Chainey-Davis is skilled in the use of Trimble GeoExplorer series Global Positioning (GPS) equipment. As a botanist, she apprenticed for several years under some of the state's leading botanists, vegetation and wetland ecologists, including Robert Holland. Ms. Davis' continuing education includes several annual intensive botanical taxonomy workshops through the U.C. Berkeley Jepson Herbarium.

A Sampling of Relevant Project Experience

Project: **Beacon Solar Energy Project Rosamond Water Alternative**
Client: **California Energy Commission (CEC)**
Conducted detailed habitat assessment and vegetation mapping for a 40-mile alternative water pipeline alignment near Mojave, CA, in support of the Final Staff Assessment. CEC evaluated the feasibility of BSEP using an alternative source of water other than onsite potable groundwater and identified City of Rosamond tertiary treated wastewater as a feasible source. Prepared supplemental report describing the vegetation resources occurring along the southern 23 miles of the 39.61-mile Rosamond water pipeline alignment, including vegetation mapping and a rare plant habitat assessment. Assisted staff in the impact assessment for the proposed and preferred alternative.

Project: **Lower Owens River Monitoring Program**
Client: **Ecosystem Sciences**
Member of a team of three biologists to design long-term monitoring program for collecting and analyzing data on riparian habitat and key wildlife habitat characteristics on 62 miles of the Lower Owens River. Directed field efforts to collect baseline data at 350 sites. Future monitoring, conducted after the initiation of appropriate flow and land management practices, will be compared against the baseline to determine if changes resulting from proposed restoration efforts (augmented stream flows) are consistent with the LORP goals and objectives.

Project: **Open ended Contract for Biological Services**
Client: **Southern California Edison (SCE)**
Led Garcia and Associates (GANDA) botanical studies (vegetation mapping, habitat assessments, etc.) in support of various SCE construction and relicensing projects in the central and southern Sierras, Sierra east slope and Great Basin region, and the eastern edge of the San Joaquin Valley.

182 Grove Street Nevada City, CA 95959 [ph] 530.478.1963 [cell] 530.205.6218 bighair60@att.net

Project: **Stanislaus River Hydroelectric Project Relicensing Studies**
Client: **Pacific Gas and Electric Company, Technical and Ecological Services**
Led GANDA field efforts to conduct floristically-based botanical studies for the Federal Energy Regulatory Commission relicensing of four hydroelectric and transmission line projects located on the Stanislaus River, Stanislaus National Forest. Riparian and watershed vegetation mapping and sampling, special-status plant surveys, noxious weed mapping, and identify and map culturally significant Native American botanical resources for local tribes in support of the Federal Energy Regulatory Commission relicensing process. Prepared draft and final reports.

Project: **Owens Lake Dust Control Project**
Client: **Garcia and Associates**
Conducted two years of floristically-based special status plant surveys and wetland delineations for the Los Angeles Department of Water and Power Owens Lake Dust Control mitigation project.

Project: **Kern River Natural Gas Pipeline**
Client: **Garcia and Associates**
Conducted floristically-based special status plant surveys for the Daggett and Goodsprings segments of the interstate pipeline.

Project: **Pit River Hydroelectric Project Relicensing Studies**
Client: **Pacific Gas and Electric Company, Technical and Ecological Services**
Led field efforts to conduct floristically-based special status plant surveys, noxious weed surveys, upland habitat mapping, and riparian vegetation classification and mapping for PG&E's Pit 3, 4, and 5 hydroelectric project in Shasta County in support of the Federal Energy Regulatory Commission relicensing process. Prepared draft and final reports.

Project: **Upper North Fork Feather River and Poe Hydroelectric Projects, Lake Almanor Habitat Management Plan**
Client: **Pacific Gas and Electric Company, Technical and Ecological Services**
Led field efforts to conduct floristic surveys for special-status plant species and noxious weeds on the Upper North Fork Feather River (Plumas and Lassen National Forests) and Poe Project Included GIS-based riparian and upland vegetation mapping in support the Federal Energy Commission relicensing process. Prepared draft and final reports. Also conducted detailed mapping of the wet meadows around Lake Almanor and prepared a long-term habitat management plan for meadow resources and willow flycatcher habitat.

Project: **Transmission Separation Project**
Client: **Foster Wheeler Environmental Corporation**
Led field efforts to conduct floristically-based special-status plant surveys and noxious weed surveys for the PG&E Transmission Separation Project. GANDA botanists conducted surveys on selected transmission line segments and their associated access roads on USDA Forest Service (USFS) lands in the Plumas, Shasta-Trinity, Tahoe, and Eldorado National Forests, created GIS-based vegetation and noxious weed maps, and analyzed potential threats to special-status plant populations. Prepared draft and final reports.

Project: **Nevada and Placer County projects – large and small subdivisions, infrastructure development, etc.**
Client: **Susan Sanders Biological Consulting and Beedy Environmental Consulting**
Conducted biological inventory and impact analyses and prepared mitigation plans for over 100 large and small subdivisions and infrastructure development projects in Nevada and Placer County. Lead writer and botanist. All projects included vegetation mapping, habitat assessments, floristic surveys, and mitigation planning. Prepared detailed habitat management plans and recreation/ trail plans for over a thousand acres of open space.

Project: **Dog Ranch-Salmon Creek Conservation Project**
Client: **Robert Holland**
Conducted endangered species surveys and documented over 300 occurrences of special status plants (using Trimble data dictionary and population sampling protocol) for a proposed conservation easement/land swap on a 400+ acre ranch in Humboldt County on the Samoa Peninsula.

182 Grove Street Nevada City, CA 95959 [ph] 530.478.1963 [cell] 530.205.6218 bighair60@att.net

Project: **Field Guide to *Epilobium* in the Sierra Nevada, Tahoe National Forest**
Client: **U.S.D.A. Forest Service, Tahoe and Inyo National Forests (Open-ended Contract)**
Conducted surveys for rare *Epilobiums* at seven sites in the Tahoe and Inyo National Forests and prepared a field guide to the genus *Epilobium* in the Sierra Nevada, with illustrations and keys to identification.

Project: **Bear Valley Meadow Restoration**
Client: **American Rivers**
Sample design and long-range monitoring design and protocol for a large-scale meadow restoration project in Placer County. Included detailed vegetation mapping, conducting baseline inventory, and preparing report on sample design and results of baseline monitoring.

Project: **Shirttail Creek Conservation Easement**
Client: **Beedy Environmental Consulting for Conservation Biology Institute**
Conducted biological inventory and conservation assessment for 800-acre property on Shirttail Creek in the American River watershed using protocol developed by The Nature Conservancy for conservation planning. Lead writer and botanist.

Project: **Natural Heritage 2020 Nevada County Watershed Assessment**
Client: **County of Nevada and Sierra Business Council**
Lead botanist for a countywide watershed and ecosystem assessment. A two-year process funded by the Sierra Business Council and the County of Nevada to create a GIS database and biotic inventory of the county's natural habitats and wildlife resources, including an assessment of vegetation, special status and invasive for 98 sub-watershed basins in the county. Prepared botanical sections of the report, verified accuracy of more than 40 GIS data themes, assessed the extent and quality of each of the county's ecosystem types, potential to support special-status plants and animals.

Project: **Special Status Plant Surveys and Habitat Mapping for Rock Creek/Cresta Hydroelectric**
Client: **Pacific Gas and Electric Company, Technical and Ecological Services**
Conducted floristically-based special status plant surveys and habitat mapping for PG&E's Rock Creek-Cresta hydroelectric facility project area and 72-mile transmission line in Plumas, Butte, Yuba and Sutter counties.

Project: **Osborne Hill Open Space Habitat Management Plan**
Client: **Susan Sanders Biological Consulting**
Prepared detailed, goal-driven, long-range habitat management plan for 250 acres of open space for a residential development in Nevada County. Included guidelines for forest management to promote old-growth conditions, fuels management specifications, habitat management specifications, and designs and implementation plan for recreational trails, educational signage, and formation of an independent non-profit land trust to manage the open space. Prepared similar plans for several other residential developments in Nevada County.

Project: **Ragsdale Creek Setback Study**
Client: **Susan Sanders Biological Consulting & County of Nevada**
Identified, described, and mapped important biological resources on an urban stream in Nevada County and recommended appropriate development setbacks to avoid/minimize impacts, assessed potential impacts to the creek as a result of adjacent development, and recommended mitigation measures to reduce impacts. Coordinated with County GIS Department in production of map of sensitive resources, and presented results of study to citizen advisory committee.

Project: **Open ended Contract for Biological Services, Various Transmission Projects**
Client: **Pacific Gas & Electric Company (PG&E)**
Led Garcia and Associates (GANDA) botanical studies (rare plant surveys, vegetation mapping, habitat assessments, etc.) in support of various PG&E transmission projects throughout California, including Kern #304, Northeast San Jose Reinforcement, Atlantic-Del Mar, Butte Reinforcement, and many more.

Project: **Open ended Contract for Biological Services, Transmission Relicensing Projects**
Client: **Southern California Edison (SCE)**
Led Garcia and Associates (GANDA) botanical studies (vegetation mapping, habitat assessments, etc.) in support of various SCE construction and relicensing projects in the central and southern Sierras, Sierra east slope and Great Basin region, and the eastern edge of the San Joaquin Valley.

182 Grove Street Nevada City, CA 95959 [ph] 530.478.1963 [cell] 530.205.6218 bighair60@att.nett

DECLARATION OF
Amy Golden

I, **Amy Golden**, declare as follows:

1. I am presently employed by The California Energy Commission in the **Siting Office** as a Biologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Biological Resources**, for the **Genesis Solar Energy Project**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/4/10 Signed: Amy Golden

At: _____

Amy W. Golden

Employment History

California Energy Commission

Planner II, Staff Biologist *11/2009 to present*

As a Staff Biologist with the Energy Commission, Ms. Golden analyzes the biological resource components of energy facilities siting applications to assess resource impacts, develop mitigation plans, and to evaluate compliance with applicable local, state, and federal laws, ordinances, regulations, and standards. In addition, she works closely with biological resource protection and management agencies and subject matter experts to ensure input into the Energy Commission and facility licensing process.

Foothill Associates

Wildlife Biologist *03/2005 to 10/2009*

While working as a private environmental consultant with Foothill Associates as a Wildlife Biologist, Ms. Golden assisted with ESA Section 7 Biological Assessments and Clean Water Act 404 permit applications primarily for private residential and commercial development projects. She performed field habitat assessments; focused species surveys for reptiles, amphibians, and vernal pool invertebrates; wetland delineations; raptor surveys; and arborist surveys. Ms. Golden performed the biological impact analysis for several parks master planning and proposed specific plan area projects. Amy also assisted with the preparation of riparian habitat mitigation plans pursuant to Section 1600 of California Fish and Game Codes and Wetland Mitigation Plans in support of Clean Water Act Section 404 Army Corps permit issuance and compliance. Ms. Golden also served as the biological lead on many CEQA projects and performed the biological field work and prepared the biological resources section for several CEQA documents.

Analytical Environmental Services

Biologist *09/2004 to 02/2005*

While with the environmental consulting firm Analytical Environmental Services as a Staff Biologist, Amy assisted with the preparation and analysis of many NEPA documents primarily for tribal projects. Ms. Golden prepared biological impact analyses and coordinated with local resource agencies on the development of mitigation plans to minimize impacts to sensitive biological resources. Amy also performed field biological assessments, wetland delineations, elderberry shrub impact assessments, and focused plant and wildlife surveys.

The Nature Conservancy

Biologist *04/2004 to 07/2004*

Ms. Golden worked on a field crew as a seasonal field biologist on a long-term avian monitoring project with The Nature Conservancy to monitor the use of montane meadows and forest edges by birds in the Sierra Nevada mountain range. Ms. Golden performed avian point counts utilizing the Variable Point Count method to document avian bird diversity in the Tahoe National Forest. Amy

operated a GPS unit, recorded all birds observed based on visual surveys and auditory calls and input all collected data into a Microsoft Excel database.

Sapphos Environmental, Inc.

Wildlife Biologist *05/2002 to 03/2004*

As a Wildlife Biologist with Sapphos Environmental, Inc., Ms. Golden performed field habitat assessments in support of biological technical analyses and reports. Amy assisted with dry desert wash delineations, desert tortoise habitat assessments and focused surveys, Incidental Take Permit applications, and several CEQA biological resources sections. Amy coordinated with local resource agencies on the development of appropriate mitigation plans and land acquisitions on several Section 7 ESA permitting projects.

EDUCATION

Environmental Forest Biology *Bachelor of Science*
State University of New York, College of Environmental Science and Forestry *May 2000*

Field Ecology
University of California Riverside Extension *Certificate in Field Ecology*
February 2004

Veterinary Science Technology
State University of New York at Delhi *Associate of Applied Science*
May 1997

DECLARATION OF

I, Sara Keeler declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting Office of the Systems Assessments and Facilities Siting Division as a Planner.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony and errata on **Biological Resources** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 06/04/10 Signed: Sara Keeler

At: Sacramento, California

Sara M. Keeler

Employment History

California Energy Commission

Planner II, Staff Biologist *12/2009 to present*

As a staff biologist with the Energy Commission, Ms. Keeler analyzes the biological resource components of energy facilities siting applications to assess resource impacts, develop mitigation, and to evaluate compliance with applicable local, state, and federal laws, ordinances, regulations, and standards. This requires working closely with biological resource protection and management agencies, subject matter experts, and Energy Commission consultants as well as with other Energy Commission staff to provide the best available information is included in staff analyses.

California Department of Transportation, District 3

Associate Environmental Planner/Environmental *11/2007 to 12/2009*

Ms. Keeler's primary duties with Caltrans were to coordinate and complete environmental documents to satisfy CEQA, NEPA, regional, and permitting requirements, and act as the Project Biologist on various transportation-related projects in California.

Entrix, Inc.

Senior Staff Scientist/Staff Scientist *01/2005 to 11/2007*

While with the environmental consulting firm Entrix, Inc., Ms. Keeler specialized in California wildlife and floristics studies. She worked throughout California including in the Lake Tahoe Basin, Great Basin, Central Valley, Sierra Nevada, in coastal California, and desert areas. Projects while at Entrix included biological resource field studies such as habitat assessments, protocol-level surveys for special-status plants and animals, wetland delineations, and riparian surveys; project, task, and budget management; and writing biological resources sections of a variety of documents including documents to satisfy NEPA and CEQA requirements, environmental assessments, and existing conditions reports.

USDA, Forest Service, Pacific Southwest Research Station

Biological Sciences Technician *05/2001 to 09/2002*

Ms. Keeler conducted breeding bird surveys and vegetation inventories and assessments on a breeding bird survey crew in the Sierra Nevada. This included conducting surveys using a variety of techniques including tree-climbing (ascenders, 3-point climbing, Swedish ladders), auditory surveys, and vegetation sampling.

EDUCATION

Biological Sciences (Evolution and Ecology) *B.S (High Honors)*
University of California, Davis *June 2004*

DECLARATION OF
Susan D. Sanders

I**, Susan D. Sanders,** declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-08-001, I am serving as a Biological Resource Specialist and Project Manager to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Biological Resources** for the **Revised Staff Assessment** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 4, 2010 Signed: _____

At: Nevada City, California

Susan Sanders Biological Consulting

12213 Half Moon Way
Nevada City, California 95959
Phone: (530) 477-7415 Fax: (530) 477-7580
ssanders55@comcast.net

RESUME OF SUSAN SANDERS

EDUCATION

Ph.D.	Zoology	University of California, Davis (1983)
M.A.	Zoology	University of California, Davis (1979)
B.A.	Zoology	University of California, Berkeley (1976)

PROFESSIONAL AFFILIATIONS/CERTIFICATIONS

Wildlife Society, Sacramento-Shasta Chapter
Sierra Nevada Willow Flycatcher Working Group
Certified by California Unified Certification Program as DBE/WBE firm (UCP # 25204)

CONTINUING EDUCATION (UC Davis, University Extension)

Threatened and Endangered Reptiles and Amphibians of Northern California
Wetlands Regulations, Impacts, and Mitigation
Endangered Species: Resources, Law, and Potential Solutions
Resolving Endangered Species Conflicts: Practical Approaches to Problem Solving

REGULATORY COMPLIANCE EXPERTISE in coordination with state, federal, and local agencies in the environmental review process for projects regulated by the California Environmental Quality Act, National Environmental Policy Act, Federal and State Endangered Species Acts, National Fish & Wildlife Coordination Act, Clean Water Act, and California Coastal Act. Also experienced in providing technical support and agency coordination for license and permit applications.

TECHNICAL EXPERTISE in surveys for threatened and endangered wildlife species; biological inventories; habitat management plans; raptor surveys; wildlife habitat assessment; mitigation monitoring; expert testimony, constraints analysis; sensitive species research. Prepared Biological Assessments for endangered, threatened, and candidate species, and conducted field surveys and literature reviews for willow flycatchers, tricolored blackbirds, Swainson's hawks, burrowing owls, California spotted owls, San Joaquin kit fox, bald eagles, valley elderberry longhorn beetles, and many other special-status species. Conducted surveys for raptor species of special concern, including white-tailed kite, northern goshawk, and Cooper's hawk.

PROJECT MANAGEMENT EXPERIENCE on large and complex projects, including a two-year survey of 11,000 acres in the Plumas National Forest for a proposed land exchange, involving supervision of eight technical specialists and subconsultants. Responsible for overseeing numerous transportation and revegetation projects and mitigation monitoring programs which involved budget, personnel, and subconsultant management, agency and client coordination, and preparation of technical reports. Managed long-term (five-year) revegetation/mitigation monitoring projects with annual reporting requirements.

CONSULTING EXPERIENCE (1982 - 2007)

CALIFORNIA ENERGY COMMISSION TECHNICAL ASSISTANCE

Currently assisting the CEC in evaluating the environmental aspects of new power plant applications throughout the state, and also providing technical expertise as an avian specialist. I have completed or am currently involved in the following projects:

- **California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development in California:** Currently **s**erving as author and coordinator for a statewide effort to develop science-based protocols for pre-and post-construction monitoring to assess the effects of wind energy development on birds and bats. Worked closely with CEC and California Department of Fish and Game staff, coordinated the efforts of an eight-member Science Advisory Committee, helped organize public workshops, worked with wind energy developers, and non-governmental organizations on this collaborative guidelines effort.
- **Pastoria Energy Facility Expansion**. Worked with CEC staff in reviewing the Application for Certification and associated reference material, prepared Data Adequacy Form, Data Request, Preliminary and Final Staff Assessment.
- **San Francisco Energy Reliability Project**: Reviewed the Application for Certification and related information material, met with CEC staff and United States Fish and Wildlife Service regarding endangered species issues, prepared and Final Preliminary Staff Assessment.
- **Black Mountain Wind Energy and 69kV Transmission Line Project**: Acting as CEC's avian specialist, reviewed the extensive literature of effects of wind development on avian populations, met with the Public Interest Energy Research staff, and prepared a comment letter on behalf of CEC for the Notice of Preparation for this project.
- **Notice of Preparation Review for Proposed Wind Energy Project:** Provided comment letters on behalf of CEC for the Notice of Preparation for Shiloh II Wind Plant Project (Solano County), and WECS 20 Project (City of Desert Hot Springs).

LITIGATION SUPPORT/EXPERT WITNESS

El Portal Road Improvement Project. Conducted field surveys and reviewed the Biological Assessment, Environmental Assessment/FONSI for the El Portal Road Improvement Project litigation (Sierra Club *et al. vs*. National Park Service). Prepared declarations and response to defendants opposition briefs, and provided other technical assistance to project attorneys. (Client: Mariposans for Environmentally Responsible Growth and Sierra Club).

Merced River Plan. Conducted field surveys and reviewed the Merced Wild and Scenic River Comprehensive Management Plan and Final Environmental Impact Statement (Sierra Club *et al. vs*. National Park Service). Prepared declarations and response to defendants opposition briefs, and provided other technical assistance to project attorneys. (Client: Friends of Yosemite Valley and Sierra Club).

Lower American River Instream Flows. Conducted original research and provided declarations on the effects of reduced instream flow to wildlife for the Friends of the American River v. EBMUD, Lower American River. Provided technical assistance to project attorneys,

prepared declarations, and provided expert testimony before the State Water Resources Control Board. (Client: Sacramento County and Friends of the American River Parkway).

Putah Creek v. Solano Irrigation District. Litigation support and expert testimony regarding wildlife/fishery impacts of reduced flows in Putah Creek. Provided depositions, declarations, expert witness testimony, and other litigation support (Client: Putah Creek Council).

CEQA/NEPA Documents. Prepared biological resource sections of Environmental Impact Reports/Statements, Initial Studies, and Environmental Assessments for numerous commercial and residential developments, redevelopment projects, transportation projects, dams, and other water projects throughout northern California. Conducted wildlife and plant community surveys, habitat assessments, agency contacts, data analysis and report preparation. Secured 1602 Streambed Alteration Agreements from California Department of Fish and Game, Section 404 Permits from U.S. Army Corps of Engineers, and 401 Permits from Regional Water Quality Control Board. Some representative projects include:

- Pacific Bell Route 101 Fiber Optic Cable, Kern County (PAR Environmental Services, Inc. [PAR]);
- Higgins Corner Marketplace, Nevada County (FHK Development);
- Hinkle Creek Nature Area Biological Inventory/Impact Analysis, Folsom (PAR);
- Willow Flycatcher Surveys, Lake Isabella Project, Kern County (Jones & Stokes);
- Biological Resources Survey, Galilee and TRC Parcels, Roseville, Placer County (PAR);
- Burrowing Owl Impact Analysis/Mitigation Monitoring, Northpointe, Sacramento County (PAR);
- Laguna Creek Interceptor and Sewer Alignment Constraints Study, Sacramento County (PAR);
- Marin Public Safety and Emergency Radio System Project, Marin County (Cord Communication)
- Biological Studies for Endangered Species Compliance, Isabella Dam, Kern County (PAR);
- Granite Quarry, Placerville (The Bedrock Group);
- Pacific-Bell Rocklin Central Dialing Station, Rocklin, Placer County (PAR);
- Whitney Oaks Raptor Surveys, Placer County (Live Oak Enterprises/Pulte Homes);
- Auburn Ranch Subdivision Project, Placer County (Area West Engineers);
- Equestrian Ridge Estates, Placer County (PAR);
- Willow Creek Assessment District Swainson's Hawk Surveys, Sacramento County (PAR);
- Bucks Lake Spotted Owls Surveys, Menasha Corporation, Plumas County (PAR);
- Roseville Water Facilities Project, City of Roseville, Placer County (Geier & Geier Consulting);
- Sugar Bowl Ski Resort Expansion, Placer County (Omni-Means, Engineers/Planners);
- City of Lincoln Waste Water Treatment Plant Expansion, Placer County (City of Lincoln);
- The Heritage at Bickford Ranch, Placer County (Geobotanical Phenomenology);
- South Branch 60 kV Pole Line Project, Roseville, Placer County (PAR);
- Smith-Moulton Pipeline Project, Nevada County (PAR);
- Morada Ranch Annexation, San Joaquin County (Omni-Means);
- Clover Valley Lakes Estates EIR, Placer County (Planning Concepts);
- Turtle Island, Loomis, Placer County (Export International);
- Fort Hunter-Liggett Wildlife Resource Surveys, Monterey County (Jones & Stokes Associates);
- Superconducting Super Collider EIR/EIS, Yolo and Solano Counties (EIP Associates);
- South Lake Tahoe Redevelopment Agency EIR, El Dorado County (Wagstaff & Brady);
- Stanford Ranch EIR, Placer County (Jones & Stokes Associates);
- Northeast Roseville Specific Plan EIR, Placer County, Placer County (Jones & Stokes Associates).
- Teichert/Granite Aggregate Mining Site, Sacramento County (Holliman, Hackard, & Taylor);
- Lower Laguna Drainage Master Plan, Sacramento County (PAR);
- Natomas Ditch Abandonment and Pipeline Construction Project, Sacramento County (PAR);
- Tuolumne River Wildlife Studies for FERC License, Tuolumne County (Holton & Associates);
- Turner Creek Hydroelectric Project, Plumas County (Jones & Stokes Associates);
- Calabazas Creek Flood Control Project, Santa Clara County (Santa Clara Valley Water District).

Transportation Projects. Prepared Caltrans Natural Environment Study Reports, Biological Assessments, Categorical Exemption/Exclusions, Preliminary Environmental Study Forms, and other documentation for bridge replacements, interchange modifications, seismic retrofits, road widenings, emergency storm damage repairs, and other transportation projects in Caltrans Districts 1, 2, 3, 4, 5, 6, and 10. Representative projects include:

- Auburn Boulevard Improvement Project, Citrus Heights, Sacramento County (PAR)
- Valley Drive Bridge Replacement Project, Nevada County (Nevada County DOTS)
- SR 101/Prado Rd. Interchange Improvement Project, San Luis Obispo County, (PAR)
- I-580/Isabel Avenue Interchange Project, Livermore, Alameda County (PAR);
- Gladding Road Bridge Replacement, Coon Creek, Placer County (Planning Concepts);
- Lozanos Road Bridge Replacement, Auburn Ravine, Placer County (PAR);
- Coyote Creek Bridge Replacement Project, Calaveras County (PAR);
- Route 99/Route 120 East Interchange Project, Manteca, San Joaquin County (PAR);
- Route 99/Prado Road Interchange, San Luis Obispo County (PAR);
- Ralston Avenue/Route 101 Interchange, Belmont, San Mateo County (PAR);
- Route 1 Improvement Project, Sand City to Seaside, Monterey County, PEAR (PAR);
- Northeast Area Transportation Plan, Constraints Analysis, Sacramento (PAR);
- Wilbur Avenue Overcrossing Project, Antioch, Contra Costa (PAR);
- Alpine Road Storm Damage Repair, San Mateo County (PAR);
- Pescadero Road Storm Damage Repair, San Mateo County (PAR);
- Route 92 Widening, Half Moon Bay, San Mateo County (PAR);
- Route 99/Hammer Lane Interchange Improvements, Stockton, San Joaquin County (PAR);
- Hammer Lane Widening, Stockton, San Joaquin County (PAR);
- La Gonda Way and Paraiso Drive Bridge Seismic Retrofit, Danville, Contra Costa County (PAR);
- Highway 162 Bridge Storm Damage Repair Project, Sacramento River, Glenn County (PAR);
- Norwood Avenue Reconstruction Project, Sacramento County (Planning Center);
- HOV Lane Construction, US 50, Sunrise to El Dorado Blvd., Sacramento/El Dorado Co. (PAR);
- Dry Creek Bridge Replacement Project, Route 99, Butte County (PAR);
- Ladies Canyon Bridge Storm Damage Repair, Sierra County, (PAR);
- Emergency Storm Damage Repair, Routes 49 and 89, Sierra and Nevada Counties, (PAR);
- Emergency Storm Damage Repair Project for: Route 70/89, Feather River Canyon, Route 20, 147, Plumas, Nevada, and Butte Counties, (PAR);
- Interstate 5 - Benjamin Holt/Hammer Lane Interchange project, San Joaquin County (PAR);
- State Route 113/Interstate 5 Connector Study, City of Woodland, Yolo County, California (PAR);
- Frederickson Road Widening, Antioch, Contra Costa County (May Consulting);
- East Lime Kiln Road Reconstruction Project, Nevada County (PAR);
- Lower Sacramento Road and Bridge Widening, Stockton, San Joaquin County (May Consulting);
- Sierra College Boulevard Widening Project, Roseville, Placer County (PAR);
- State Route 50/Folsom Interchange Improvement Project, Sacramento County (PAR);
- Pico Creek Bridge Replacement Project, Route 1, San Luis Obispo County (PAR)
- Burns Creek Bridge Replacement Project, Route 1, Monterey County (PAR);
- Pajaro River Bridge Replacement Project, Monterey and San Luis Obispo Counties (PAR);
- Route 113 Widening/North 1st Street Improvements, Dixon, Solano County (Planning Concepts);
- Bridgeport School Bridge Replacement Project, El Dorado County (PAR);
- State Route 49 Widening, Auburn, Placer County (PAR);
- Claus Road Bridge Widening, Modesto, Stanislaus County (PAR);
- Interstate 80/Enterprise Boulevard Interchange, City of West Sacramento, Yolo County (PAR).

Nevada County Biological Inventories/Habitat Management Plans. Conducted site specific vegetation and wildlife surveys in accordance with Policy 13.2A of the Nevada County General Plan; prepared Management Plans in accordance with Sec. L-II 4.3.3, General Provisions of the July 27, 2000 Zoning Ordinances. Representative projects include:

- Waxman Parcel Biological Inventory, Old Wood Road (Nevada City Engineering)
- Habitat Management Plan for DesJardins Dry Creek Crossing (Cranmer Engineering)
- Gregory Creek Biological Inventory, Truckee (King Engineering)
- Landon Parcel Biological Inventory and Management Plan, Wolf Road (California Survey Company)
- Oslin-Tarkowski Biological Inventory, Peardale (Ms. Jeanette Oslin)
- Jackson Parcel, Purdon Road (Mr.
- Hyatt Property Biological Inventory and Management Plan, Dry Creek (Mr. Mike Hyatt)
- Penn Valley Community Church, Penn Valley (Mr. Keith Brown)
- Chapa-De Health Clinic, Grass Valley (Ms. Elaine. Lieske, Architect)
- Inventory and Management Plan for Agren Pond Project, Penn Valley (Mr. Ray Agren)
- Humboldt Lily Plant Preservation Plan (Sares-Regis Group)
- Moore Property, Chicago Park (American Surveys)
- Callaghan Property, Lake of the Pines (Sylvester Engineering)
- Tracy Property, Duggans Road (Cranmer Engineering)
- Ragsdale Creek Setback Study, Higgins Area (Nevada County Planning Department)
- CDFG 1603 Permit Application, Eskaton Village, Grass Valley (Sares-Regis Group)
- Cedar Ridge Baptist Church Expansion, Cedar Ridge (Cedar Ridge Baptist Church)
- Penn Valley Properties, Penn Valley (Sylvester and Creighton)
- Record Connection Property, Brunswick Basin (Daggett Design)
- Droitcour Property, Wolf Road (Mr. Gerald Stapp)
- Hyepark Estates, near Wolf Road (King Engineering)
- Bartel Property Lake Setback (Nevada City Engineering)
- KLOVE Radio Tower, Banner Mountain (Westower Communications)
- Haas-Menasha Property, Ponderosa Way, Rough and Ready (Cliff McDivitt Surveying)
- Eskaton Village, Grass Valley (Sylvester & Creighton)
- Quist Property, Higgins Corner (Sylvester & Creighton)
- Hobart Mills Industrial Park (Sylvester & Creighton)
- Milhous Ranch, North San Juan (Sylvester & Creighton)
- Extasia Workshop Project, Tyler Foote Crossing Road, San Juan Ridge (Mr. Bruce Boyd, AIA);
- Flynn Property, Retrac Way, Grass Valley (Mr. Martin Flynn);
- McGuire Property, Banner Lava Cap Road, Nevada City (Mr. Kirk McGuire);
- Biological Inventory for 240-acre parcel near Donner Lake (Mr. James Mitchell);
- Brunswick Inn Project, Grass Valley (Sylvester Engineering);
- Lopez Tentative Map, Scott's Flat Road (Sylvester Engineering);
- Sierra Knoll Estates, Higgins Corner (Mr. and Mrs. Steve Joos);
- Smallwood Property, Grass Valley (Mr. Jay Smallwood).
- Harmony Ridge Resort (Sylvester & Creighton)

Land Exchanges. Prepared Biological Assessments/Evaluations for Forest Service land exchanges in the Plumas National Forest. The largest of these was the 11,000 acre Soper-Wheeler Company land exchange, a two-year project requiring management of eight employees and several subconsultants for surveys of rare plants, California spotted owls, northern goshawks, red-legged frogs, and other sensitive species. Other projects include the Crites Mineral Fraction Land Exchange and the Saunders Land Exchange, Plumas National Forest, (PAR).

Mitigation Monitoring. Supervised the design and ongoing monitoring of wetland and sensitive species mitigation projects, including riparian revegetation, vernal pool creation, and mitigation banking. Some projects involved preparation of a Habitat Mitigation and Monitoring Plan, and long-term monitoring efforts (five years plus), as well as preparation of annual reports, and

coordination with US Army Corps of Engineers, US Fish and Wildlife Service, California Department of Fish and Game, California Department of Transportation, and the US Environmental Protection Agency. Projects include:

- Humboldt Lily Mitigation Monitoring, Eskaton Village, Nevada County (Eskaton)
- Dark Horse Mitigation Monitoring, Nevada County (Nevada City Engineering)
- Northpointe, Burrowing Owl Mitigation Monitoring, Sacramento County (PAR)
- Burrowing Owl Mitigation Monitoring, Meadowview, Sacramento County (PAR)
- Wilbur Avenue Overhead Project, Habitat Restoration for Lange's Metalmark Butterfly, Antioch, Contra Costa County, (PAR)
- Swainson's Hawk Nest Monitoring, Garden Highway, Sacramento, Sacramento County (PAR)
- Sierra College Boulevard Riparian Revegetation Monitoring, Roseville, Placer County (PAR);
- Roseville Sanitary Landfill Riparian Revegetation Project, Roseville, Placer County (PAR);
- State Route 99/Calvine Interchange Vernal Pool Vegetation and Fairy Shrimp Mitigation Monitoring, Sacramento County (PAR);
- Potrero Hills Landfill Bird Deterrence Monitoring, Solano County (Global Environmental);
- State Route 50/Folsom Boulevard Improvement Project, Beach Lakes Mitigation Bank (PAR);
- Niblick Bridge Riparian Revegetation and Mitigation Monitoring, San Luis Obispo County (PAR).

TEACHING EXPERIENCE

Lecturer. Biology 10, UCD Zoology Department (1985): Instructor - biology for non-majors.
Lab Coordinator. Zoology 2L, UCD Zoology Department (1983-1984): Trained and supervised teaching assistants, managed introductory zoology laboratories.
Teaching Assistant. UCD Zoology Department (1977-1983): General Zoology, Vertebrate Structure, Introductory Biology.
Outstanding UCD Graduate Teaching Assistant (1983).

PUBLICATIONS

California Energy Commission and California Department of Fish and Game. 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.* Commission Final Report. California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. CEC700-2007-008-CMF.

Beedy, E. C., S. D. Sanders, and D. A. Bloom. 1991. Breeding status, distribution, and habitat associations of the tricolored blackbird (*Agelaius tricolor*), 1850-1989. June 21, 1991. Jones & Stokes Associates (JSA 88-187.) Sacramento, CA. Prepared for USFWS, Sacramento, CA.

Flett, M. A. and S. D. Sanders. 1987. Ecology of a Sierra Nevada population of Willow Flycatchers. Western Birds. 18:37-42.

Fowler, C., B. Valentine, S. Sanders, and M. Stafford. 1991. Habitat Suitability Index Model: Willow Flycatcher (*Empidonax traillii*). USDA Forest Service, Tahoe National Forest.

Harris, J. D., S. D. Sanders, and M. A. Flett. 1987. Willow Flycatcher surveys in the Sierra Nevada. Western Birds. 18:27-36.

Sanders, S. D. 1983. Foraging Ecology of a Sierra Nevada population of Douglas Tree Squirrels (*Tamiasciurus douglasii*). Ph.D. Dissertation, University of California, Davis.

Sanders, S. D. and M. A. Flett. 1989. The ecology of a Sierra Nevada population of Willow Flycatchers (*Empidonax traillii*), 1986 and 1987. California Management Branch Administrative Report No. 89-3, California Department of Fish and Game.

DECLARATION OF
Alvin J. Greenberg, Ph.D.

I, **Alvin J. Greenberg, Ph.D.** declare as follows:

1. I am presently a consultant to the California Energy Commission, Energy Facilities Siting and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the Revised Staff Testimony on the **Public Health, Hazardous Materials Management, and Worker Safety/Fire Protection** sections for the **Genesis Solar Energy Project Application** based on my independent analysis of the amendment petition, supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 7, 2010 Signed: [signature]

At: Sacramento, California

Risk Science Associates

121 Paul Dr., Suite A, San Rafael, Ca. 94903-2047
415-479-7560 fax 415-479-7563
e-mail agreenberg@risksci.com

Name & Title: **Alvin J. Greenberg, Ph.D., FAIC, REA, QEP**
Principal Toxicologist

Dr. Greenberg has had over two decades of complete technical and administrative responsibility as a team leader in the preparation of human and ecological risk assessments, air quality assessments, hazardous materials handling and risk management/prevention, infrastructure vulnerability assessments, occupational safety and health, hazardous waste site characterization, interaction with regulatory agencies in obtaining permits, and conducting lead surveys and studies. He has particular expertise in the assessment of dioxins, lead, diesel exhaust, petroleum hydrocarbons, mercury, the intrusion of subsurface contaminants into indoor air, and the preparation and review of public health/public safety sections of EIRs/EISs. Dr. Greenberg's expertise in risk assessment has led to his appointment as a member of several state and federal advisory committees, including the California EPA Advisory Committee on Stochastic Risk Assessment Methods, the US EPA Workgroup on Cumulative Risk Assessment, the Cal/EPA Peer Review Committee of the Health Risks of Using Ethanol in Reformulated Gasoline, the California Air Resources Board Advisory Committee on Diesel Emissions, the Cal/EPA Department of Toxic Substances Control Program Review Committee, and the DTSC Integrated Site Mitigation Committee. Dr. Greenberg is the former Chair of the Bay Area Air Quality Management District Hearing Board, a former member of the State of California Occupational Health and Safety Standards Board (appointed by the Governor), and former Assistant Deputy Chief for Health, California OSHA. And, since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments, power plant security programs, and conducting safety and security audits of power plants for the California Energy Commission and has assisted the CEC in the assessment of safety and security issues for proposed LNG terminals. In addition to providing security expertise to the State of California, Dr. Greenberg was the Team Leader and main consultant to the State of Hawaii on the updating of their Energy Emergency Preparedness Plan.

Years Experience: 26

Education:

B.S. 1969 Chemistry, University of Illinois Urbana

Ph.D. 1976 Pharmaceutical/Medicinal Chemistry, University of California, San Francisco

Postdoctoral Fellowship 1976-1979 Pharmacology/Toxicology, University of California, San Francisco

Postgraduate Training 1980 Inhalation Toxicology, Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM

Professional Registrations:

Board Certified as a Qualified Environmental Professional (QEP)
California Registered Environmental Assessor - I (REA)
Fellow of the American Institute of Chemists (FAIC)

Professional Affiliations:

Society for Risk Analysis
Air and Waste Management Association
American Chemical Society
American Association for the Advancement of Science
National Fire Protection Association

Technical Boards and Committee Memberships - Present:

Squaw Valley Technical Review Committee
(appointed 1986)

Technical Boards and Committee Memberships - Past:

July 1996 – March 2002
Member, Bay Area Air Quality Management District Hearing Board
(Chairman 1999-2002)
September 2000 – February 2001
Member, State Water Resources Control Board Noncompliant Underground Tanks Advisory Group
January 1999 – June 2001
Member, California Air Resources Board Advisory Committee on Diesel Emissions
January 1994 - September 1999
Vice-Chairman, State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee
September 1998
Member, US EPA Workgroup on Cumulative Risk Assessment
April 1997 - September 1997
Member, Cal/EPA Private Site Manager Advisory Committee
January 1986 - July 1996
Member, Bay Area Air Quality Management District Advisory Council
(Chairman 1995-96)
January 1988 - June 1995
Member: California Department of Toxic Substance Control Site Mitigation Program Advisory Group
January 1989 - February 1995
Member: Department of Toxics Substances Control Review Committee, Cal-EPA

October 1991 - February 1992
Chair: Pollution Prevention and Waste Management Planning Task Force of the Department of Toxics Substances Control Review Committee, Cal-EPA

September 1990 - February 1991
Member: California Integrated Waste Management Board Sludge Advisory Committee

September 1987 - September 1988
ABAG Advisory Committee on Regional Hazardous Waste Management Plan

March 1987 - September 1987
California Department of Health Services Advisory Committee on County and Regional Hazardous Waste Management Plans

January 1984 - October 1987
Member, San Francisco Hazardous Materials Advisory Committee

March 1984 - March 1987
Member, Lawrence Hall of Science Toxic Substances and Hazardous Materials Education Project Advisory Board

Jan. 1, 1986 - June 1, 1986
Member, Solid Waste Advisory Committee, Governor's Task Force on Hazardous Waste

Jan. 1, 1983 - June 30, 1985
Member, Contra Costa County Hazardous Waste Task Force

Sept. 1, 1982 - Feb. 1, 1983
Member, Scientific Panel to Address Public Health Concerns of Delta Water Supplies, California Department of Water Resources

Present Position

January 1983- present
Owner and principal with Risk Sciences Associates, a Marin County, California, environmental consulting company specializing in multi-media human health and ecological risk assessment, air pathway analyses, hazardous materials management-infrastructure security, environmental site assessments, review and evaluation of EIRs/EISs, preparation of public health and safety sections of EIRs/EISs, and litigation support for toxic substance exposure cases.

Previous Positions

Jan. 2, 1983 - June 12, 1984
Member, State of California Occupational Safety and Health Standards Board (Cal/OSHA), appointed by the Governor

Aug. 1, 1979 - Jan. 2, 1983
Assistant Deputy Chief for Health, California Occupational Safety and Health Administration

Feb. 1, 1979 - Aug. 1, 1979

Administrative Assistant to Chairperson of Finance Committee, Board of Supervisors, San Francisco

Jan. 1, 1976 - Feb. 1, 1979
Research Pharmacologist and Postdoctoral Fellow, Department of Pharmacology and Toxicology, School of Medicine, University of California, San Francisco

Jan. 1, 1975 - Dec. 31, 1975
Acting Assistant Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco

Experience

General

Dr. Greenberg has been a consultant in Hazardous Materials Management and Security, Human and Ecological Risk Assessment, Occupational Health, Toxicology, Hazardous Waste Site Characterization, and Toxic Substances Control Policy for over 26 years. He has broad experience in the identification, evaluation and control of health and environmental hazards due to exposure to toxic substances. His experience includes Community Relations Support and Risk Communication through experience at high-profile sites and presentations at professional society meetings.

He has considerable experience in the review and evaluation of exposure via the air pathway - particularly to emissions from power plants, refineries, and diesel exhaust - and a thorough knowledge of the regulatory requirements through his experience at Cal/OSHA, the BAAQMD Hearing Board, as a consultant to the California Energy Commission, and in preparing such assessments for local government and industry. He has assessed exposures to diesel exhaust during construction and operations of stationary and mobile sources and has testified at evidentiary hearings numerous times on this subject.

He is presently assisting the California Energy Commission in assessing the risks to workers and the public of proposed power plants and LNG terminals in the state. His experience in hazard identification, exposure assessment, risk assessment, occupational safety and health, emergency response, and Critical Infrastructure Protection has made him a valuable part of the CEC team addressing this issue. He has reviewed and commented on the DEIS/DEIR for the proposed SES LNG Port of Long Beach terminal, focusing on security issues for the CEC and on safety matters for the City of Long Beach. He has presented technical information and analysis to the State of California Interagency LNG Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

He served for over five years as the Vice-chair of the California State Water Resources Control Board Advisory Committee convened to address toxic substances in sediments in bays, rivers, and estuaries. He has been a member of the Squaw Valley Technical Review Committee since 1986 establishing chemical application management plans at golf courses to protect surface and

groundwater quality. He has also conducted numerous ecological risk assessments and characterizations, including those for marine and terrestrial habitats.

Dr. Greenberg has extensive experience in data collection and preparation of human and ecological risk assessments on numerous military bases and industrial sites with Cal/EPA DTSC and RWQCB oversight. He has also been retained to provide technical services to the Cal/EPA Department of Toxic Substances Control (preparation of human health risk assessments) and the Office of Environmental Health Hazard Assessment (review and evaluation of air toxics health risk assessments and preparation of profiles describing the acute and chronic toxicity of toxic air contaminants). He has also conducted several surveys of sites containing significant lead contamination from various sources including lead-based paint, evaluated potential occupational exposure to lead dust and fumes in industrial settings, prepared numerous human health risk assessments of lead exposure, and prepared safety and health plans for remedial investigation of lead contaminated soils. Dr. Greenberg is also a recognized expert on the requirements of California's Proposition 65 and has served as an expert on Prop. 65 litigation.

Liquefied Natural Gas (LNG)

Dr. Greenberg assisted the CEC in the preparation of the "background" report on the risks and hazards of siting LNG terminals in California ("LNG in California: History, Risks, and Siting" July 2003) and consulted for the City of Vallejo on a proposed LNG terminal and storage facility at the former Mare Island Naval Shipyard. He has also conducted an evaluation and prepared comments on the risks, hazards, and safety analysis of the DEIS/DEIR for the City of Long Beach on a proposed LNG terminal at the Port of Long Beach (POLB) and conducted an analysis on vulnerability and critical infrastructure security for the CEC on this same proposed LNG terminal. He currently advises the CEC on the POLB LNG proposal on risks, hazards, human thresholds of thermal exposure, vulnerability, security, and represented the CEC at a U.S. Coast Guard briefing on the Waterway Suitability Assessment that included the sharing of SSI (Sensitive Security Information). He has presented technical information and analysis to the State of California LNG Interagency Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

Infrastructure Security

Since 2002, Dr. Greenberg has been trained by and is working with the Israeli company SB Security, LTD, the most experienced and tested security planning and service company in the world. Since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments and power plant security programs for the California Energy Commission (CEC). In taking the lead for this state agency, Dr. Greenberg has interfaced with the California Terrorism Information Center (CATIC) and provided analysis, recommendations, and testimony at CEC evidentiary hearings regarding the security of power plants within the state. These analyses include the assessment of Critical Infrastructure Protection, threat assessments, criticality assessments, and the preparation of vulnerability assessments and off-site consequence analyses addressing the use, storage, and transportation of hazardous materials, recommendations for security to reduce the threat from foreign and domestic terrorist activities, perimeter security, site access by personnel and vendors, personnel background checks,

management responsibilities for facility security, and employee training in security methods. Dr. Greenberg is the lead person in developing a model power plant security plan, vulnerability assessment matrix, and a security training manual for the CEC. The model security plan is used by power plants in California as guidance in developing and implementing security measures to reduce the vulnerability of California's energy infrastructure to terrorist attack. He has testified at several evidentiary hearings for the CEC on power plant security issues. He also leads an audit team conducting safety and security audits at power plants throughout California that are under the jurisdiction of the CEC. In addition to providing security expertise to the State of California, in August 2004, a team of experts led by Dr. Greenberg was awarded an 18-month contract by the State of Hawaii to update and improve the state's Energy Emergency Preparedness Plan and make recommendations for increased security of critical energy infrastructure on this isolated group of islands.

Air Pathway Analysis

Dr. Greenberg has prepared numerous Air Pathway Analyses and human health risk assessments, evaluating exposure at numerous locations in California, Hawai'i, Oregon, Minnesota, Michigan, and New York. He is experienced in working with Region IX EPA, the State of California DTSC, and the Hawai'i Department of Health Clean Air Branch in the application of both site-specific and non site-specific health risk assessment criteria.

Examples

Human Health Risk Assessment for the Open Burn/Open Detonation Operation at McCormick Selph, Inc., Hollister, Ca. (June 2003)

Air Quality and Human Health Risk Assessment for the Royal Oaks Industrial Complex, Monrovia, Ca. (January 2003)

Human Health Risk Assessment and Indoor Vapor Intrusion Assessment for the former Pt. St. George Fisheries Site, Santa Rosa, Ca. (October 2002)

Human Health Risk Assessment for the former Sargent Industries Site, Huntington Park, Ca. (July 2001)

Ballard Canyon Air Pathway Analysis and Human Health Risk Assessment, Santa Barbara County, Ca. (September 2000)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawai'i (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (March 1993)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

Cancer Risk Assessment for the H-Power Generating Station, Campbell Industrial Park, Oahu, Hawai'i (1988)

Hazardous Materials Assessments, Waste Management Assessments, Worker Safety and Fire Protection Assessments, and Public Health Impacts Assessments

Dr. Greenberg also has significant experience as a consultant and expert witness for the California Energy Commission providing analysis, recommendations, and testimony in the areas of hazardous materials management, process safety management, waste management, worker safety and fire protection, and public health impacts for proposed power plant/cogeneration facilities. These analyses include the evaluation and/or preparation of the following:

- Off-site consequence analyses of the handling, use, storage, and transportation of hazardous materials,
- Risk Management Plans (required by the Cal-ARP) and Business Plans (required by H&S Code section 25503.5),
- Safety Management Plans (required by 8 CCR section 5189),
- Natural gas pipeline safety,
- Solid and hazardous waste management plans,
- Phase I and II Environmental Site Assessments,
- Construction and Operations Worker Safety and Health Programs,
- Fire Prevention Programs,
- Human health risk assessment from stack emissions and from diesel engines, and
- Mitigation measures to address PM exposure, including diesel particulates

Examples

- San Francisco Energy Reliability Project, San Francisco, Ca. 2004-present. Hazardous materials management, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Malburg Generating Station Project, City of Vernon, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Blythe II, Blythe, Ca. 2002-3. hazardous materials, worker safety/fire protection,
- Palomar Energy Center, Escondido, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Project, Rancho Seco, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Project, Tesla, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- San Joaquin Valley Energy Center, San Joaquin, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management
- Morro Bay Power Plant, Morro Bay, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Potrero Power Plant Unit 7, San Francisco, Ca., 2001-2: hazardous materials, worker safety/fire protection
- El Segundo Power Redevelopment Project, El Segundo, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Rio Linda Power Project, Rio Linda, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Pastoria II Energy Facility Expansion, Grapevine, Ca., 2001: hazardous materials, worker safety/fire protection
- East Altamont Energy Center, Byron, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Magnolia Power Project, Burbank, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Russell City Energy Center, Hayward, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Woodbridge Power Plant, Modesto, Ca., 2001: hazardous materials, worker safety/fire protection, waste management
- Colusa Power Plant Project, Colusa County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Valero Refinery Cogeneration Project, Benicia, Ca., 2001: hazardous materials, worker safety/fire protection
- Ocotillo Energy Project, Palm Springs, Ca., 2001: hazardous materials, worker safety/fire protection
- Gilroy Energy Center Phase II Project, Gilroy, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Los Esteros Critical Energy Facility, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Roseville Energy Facility, Roseville, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health

- Spartan Power, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- South Star Cogeneration Project, Taft, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Plant, Eastern Alameda County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tracy Peaker Project, Tracy, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Henrietta Peaker Project, Kings County, Ca., 2001: hazardous materials, worker safety/fire protection, waste management, public health
- Central Valley Energy Center, San Joaquin, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Plant, Rancho Seco, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Los Banos Voltage Support Facility, Western Merced County, Ca., 2001-2: waste management, public health
- Palomar Energy Project, Escondido, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Metcalf Energy Center, San Jose, Ca., 2000-1: hazardous materials
- Blythe Power Plant, Blythe, Ca., 2000-1: hazardous materials
- San Francisco Energy Co. Cogeneration Project, San Francisco, Ca., 1994-5: hazardous materials
- Campbell Soup Cogeneration Project, Sacramento, Ca., 1994: hazardous materials
- Proctor and Gamble Cogeneration Project, Sacramento, Ca., 1993-4: hazardous materials
- San Diego Gas and Electric South Bay Project, Chula Vista, Ca., 1993: hazardous materials
- SEPCO Project, Rio Linda, Ca., 1993: hazardous materials
- Shell Martinez Manufacturing Complex Cogeneration Project, Martinez, Ca., 1993: hazardous materials and review and evaluation of EIR
- SFERP Project, San Francisco, Ca. 2004 – 2006. hazardous materials, worker safety/fire protection, waste management, public health

Occupational Safety and Health/Health and Safety Plans/Indoor Air Quality

Dr. Greenberg has significant experience in occupational safety and health, having directed the development, adoption, and implementation of over 50 different Cal/OSHA regulations, including airborne contaminants (>450 substances), lead, asbestos, confined spaces, and worker-right-to-know (MSDSs). He has conducted numerous occupational health surveys and has extensive experience in the sampling and analysis of indoor air quality at residences, workplaces, and school classrooms. He is currently the team leader conducting safety and security audits at power plants throughout California for the California Energy Commission. Safety issues audited include compliance with regulations addressing several safety matters, including but not limited to, confined spaces, lockout/tagout, hazardous materials, and fire prevention/suppression equipment.

Examples

Review and Evaluation of Public and Worker Safety Issues at the proposed SES LNG Facility, Port of Long Beach. prepared for the City of Long Beach. (November 2005)

Confidential safety and security audit reports for 18 power plants in California. prepared for the California Energy Commission. (January 2005 through March 2006)

Report on the Accidental release and Worker Exposure to Anhydrous Ammonia at the BEP I Power Plant, Blythe, Ca. prepared for the California Energy Commission. (October 2004)

Investigation of a Worker Death in a Confined Space, La Paloma Power plant. prepared for the California Energy Commission. (July 2004)

Preliminary Report on Indoor Air Quality in Elementary School Portable Classrooms, Marin County, Ca. (December 1999)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Air Pathway Analysis for the Ballard Canyon Landfill. Submitted to the County of Santa Barbara, (March 1999)

Review and Evaluation of the Health Risk Assessment for Outdoor and Indoor Exposures at the Former Golden Eagle Refinery Site, Carson, Ca. (May 1998)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Determination of Occupational Lead Exposure at a Tire Shop in Placerville, Ca. (April 1993)

Development of an Environmental Code of Regulations for Hazardous Waste Treatment Facilities on La Posta Indian Tribal lands, San Diego County, Ca. (August 1992)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Sites with RWQCB and/or DTSC Oversight

Dr. Greenberg has specific experience in assessing human health and ecological risks at contaminated sites at the land/water interface, including petroleum contaminants, metals, mercury, and VOCs at several locations in California including Oxnard, Richmond, Avila Beach, Mare Island Naval Shipyard, San Diego, Hollister, San Francisco, Hayward, Richmond, the Port of San Francisco, and numerous other locations. He has used Cal/EPA methods, US EPA

methods, and ASTM Risk Based Corrective Action (RBCA) and Cal/Tox methodologies. He is extremely knowledgeable about SWRCB and SF Bay RWQCB regulations on underground storage tank sites and with ecological issues presented by contaminated sediments including sediment analysis, toxicity testing, tissue analysis, and sediment quality objectives. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Dr. Greenberg experience on many of these contaminated sites has been as a consultant to local governments, state agencies, and citizen groups. He assisted the City and County of San Francisco in developing local ordinance requiring soil testing (Article 20, Maher ordinance) and hazardous materials use reporting (Article 21, Walker ordinance). He served as the City of San Rafael's consultant to provide independent review and evaluation of the site characterization and remedial action plan prepared for a former coal gasification site. He was a consultant to a citizen group in northern California regarding exposure and risks due to accidental releases from a petroleum refinery and assisted in the assessment of risks due to crude petroleum contamination of a southern California beach. He has prepared a number of risk assessments addressing crude petroleum, diesel and gasoline contamination, including coordinating site investigations, environmental monitoring, and health risk assessment for the County of San Luis Obispo regarding Avila Beach subsurface petroleum contamination. That high-profile project lasted for over one year and Dr. Greenberg managed a team of experts with a budget of $750,000. Another high-profile project included the preparation of an extensive comprehensive human and ecological risk assessment for the Hawaii Office of Space Industry on rocket launch impacts and transportation/storage of rocket fuels at the southern end of the Big Island of Hawaii. Dr. Greenberg's risk assessments were part of the EIS for the project. Dr. Greenberg also worked on another high-profile project conducting Air Pathway Analysis of off-site and on-site impacts from landfill gas constituents, including indoor and outdoor air measurements, air dispersion modeling, flux chamber investigations, and health risk assessment for the County of Santa Barbara. Dr. Greenberg has conducted RI/FS work, prepared health risk assessments, evaluated hazardous waste sites and hazardous materials use at numerous locations in California, Hawaii, Oregon, Minnesota, Michigan, and New York. He has considerable experience in the development of clean-up standards and the development of quantitative risk assessments for site RI/FS work at CERCLA sites, as well as site closures, involving toxic substances and petroleum hydrocarbon wastes. He is experienced in working with both Region IX EPA and the State of California DTSC in negotiating clean-up standards based on the application of both site-specific and non site-specific health and ecological based clean-up criteria. He has significant experience in the development of site chemicals of concern list, quantitative data quality levels, site remedial design, the site closure process, the design and execution of data quality programs and verification of data quality prior to its use in the decision making process on large NPL sites.

Examples

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)
The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment, Ecological Screening Evaluation, and Development of Proposed Remediation Goals for the Flair Custom Cleaners Site, Chico, California (January 1996)

Human Health Risk Assessment for the X-3 Extrudate Project at Criterion Catalyst, Pittsburg, Ca. (November 1994)

Screening Health Risk Assessment and Development of Proposed Soil Remediation Levels at Hercules Plant #3, Culver City, Ca. (July 1993)

Ecological Screening Evaluation for the Altamont Landfill, Alameda County, Ca. (June, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawaii (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (March 1993)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Screening Health Risk Assessment for the Proposed Expansion of the West Marin Sanitary Landfill, Point Reyes Station, Ca.
(March, 1993)

Health Risk Assessment for the Proposed Expansion of the Forward, Inc. Landfill, Stockton, Ca. (September 14, 1992)

Health Risk Assessment for the Rincon Point Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Health Risk Assessment for the South Beach Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Screening Health Risk Assessment and Development of Proposed Soil and Groundwater Remediation Levels, Kaiser Sand and Gravel, Mountain View, Ca. Prepared for Baseline Environmental Consulting (January 30, 1992)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Preliminary Health Risk Assessment for the City of Pittsburg Redevelopment Agency, Pittsburg, California (May 29, 1991)

Military Bases

Dr. Greenberg has experience in conducting assessments at DOD facilities, including RI/FS work, preparation of health risk assessments, evaluation of hazardous waste sites and hazardous materials use at the following Navy sites in California: San Diego Naval Base; Marine Corps Air-Ground Combat Center, 29 Palms; Mare Island Naval Shipyard, Vallejo; Treasure Island Naval Station, San Francisco, Hunters Point Naval Shipyard, San Francisco, and the Marine Corps Logistics Base, Barstow. He worked with the U.S. Navy and the U.S. EPA in the implementation of Data Quality Objectives (DQO's) at MCLB, Barstow.

Examples

Review and Evaluation of the Remedial Investigation Report and Human Health Risk Assessment for the U. S. Naval Station at Treasure Island, Ca. (June 1999)

Screening Health Risk Assessment for the Proposed San Francisco Police Department's Helicopter Landing Pad at Hunters Point Shipyard, San Francisco, Ca. (September 1997)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Health Risk Assessment for the Chrome Plating Facility, Mare Island Naval Shipyard, Vallejo, California (October 24, 1988)

Background Levels and Health Risk Assessment of Trace Metals present at the Naval Petroleum Reserve No.1, 27R Waste Disposal Trench Area, Lost Hills, California (August 12, 1988)

RCRA Facility Investigation (RFI) Work Plan of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 14, 1989)

Hazardous Waste and Solid Waste Audit and Management Plan, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (July 3, 1989)

Water Quality Solid Waste Assessment Test (SWAT) Proposal RCRA Landfill, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (October 31, 1988)

Waste Disposal Facilities, Waste Haulers, Waste Recycling Facilities Report, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 22, 1988)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Air Quality Solid Waste Assessment Test (SWAT) Proposal, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 25, 1988)

Mercury Contamination

Dr. Greenberg has prepared and/or reviewed several human health and ecological risk assessments regarding mercury contamination in soils, sediments, and indoor surfaces. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Examples

Review and evaluation of a human health risk assessment of ingestion of sport fish caught from San Diego Bay and which contain tissue levels of mercury and PCBs (November 2004 – present)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

DECLARATION OF
Testimony of Negar Vahidi

I**, Negar Vahidi,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as a **Senior Project Manager/Senior Land Use Technical Specialist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Land Use** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 10, 2010 Signed: _____

At: Agoura Hills, California

NEGAR VAHIDI
Senior Associate

ACADEMIC BACKGROUND

Master of Public Administration, University of Southern California, 1993
B.A., Political Science, University of California, Irvine, 1991

Ms. Vahidi is a planner with more than nine years experience in socioeconomic, land use, and public policy analysis for major infrastructure, development, flood control, and institutional projects throughout the State of California. Her expertise lies in demographic data assessment and technical studies, identification and categorization of existing land uses, policy consistency analysis and policy development, evaluation of physical socioeconomic and land use impacts, and development of land use alternatives. A brief list of relevant projects for which she has conducted socioeconomic and land use assessments, or managed the preparation of the environmental document, is provided below:

Land Use Assessment for Industrial Projects:

- Pacific Pipeline EIS/SEIR Project
- Alturas Transmission Line EIR/S Project
- Santa Fe Pacific Pipeline EIR Project
- Six Flags Substation and Power Line Project
- Calnev Substation and Power Line Project
- Yellowstone Pipeline Reroute EIS Project
- CPUC Hydroelectric Plant Divestiture Project - ongoing

Environmental Studies

- MTA Mid-City/Westside Corridor Study
- St. Francis Medical Hospital Focused EIR
- Santa Monica College Parking Structure B EIR
- Berkeley Manor Condominium Technical Reports
- Huntington Beach Waterfront Development Project Section 108 Loan Guarantee Funds EA
- Imperial Beach Shore Protection EIR/EIS
- U.S. Food and Drug Administration Laboratory EIR/EIS
- National Guard Armory Building EA
- EA for Area Lighting, Fencing, and Roadways at the International Border
- Border Patrol Checkpoint Station EA

Specific Plans, Residential and Mixed-Use Development, and Redevelopment Projects

- Wes Thompson Ranch Development Project EIR
- Cabrillo Plaza Specific Plan EIR
- Culver City Redevelopment Plan and Merger EIR
- Dana Point Headlands Specific Plan EIR
- Seaview Court Condominiums IS/MND
- Pico Union Block 6 Residential Development Revised EIR
- Four-Story Hotel IS/MND, City of Santa Monica
- Santa Monica College Parking Structure B Replacement EIR
- Huntington Beach Blocks 104/105 Redevelopment Project EIR
- Berkeley Manor Condominiums EIR
- Santa Monica North Main St. Mixed-Use Development Project EIR

Water and Wastewater Facilities

- San Antonio Dam EIS
- Whitewater/Thousand Palms Flood Control Project
- San Antonio Creek Bridges Project at Vandenberg Air Force Base
- Lower Santa Ana River Operations and Maintenance EA

Resource Management

- Upper Newport Bay Environmental Restoration Project
- Rio Salado Environmental Restoration EIS

Miscellaneous Studies

- Pacific Pipeline Mitigation Monitoring, Compliance and Reporting Program
- Technical Support to NEPA Lawsuit
- Industry-wide Survey for the South Coast Air Quality Management District

Professional Affiliations

- American Planning Association, Los Angeles Chapter Board Member

DECLARATION OF
Erin Bright

I**, Erin Bright,** declare as follows:

1. I am presently employed by the California Energy Commission in the **Engineering Office** of the Siting Transmission and Environmental Protection Division as a **Mechanical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Noise and Vibration** for the **Genesis Solar Energy Project** based on my independent analysis of the Application, supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 10, 2010 Signed: _____

At: Sacramento, California

Erin Bright
Mechanical Engineer

Experience Summary

Two years of experience in the electric power generation field, including analysis of noise pollution, construction/licensing of electric generating power plants, and engineering and policy analysis of thermal power plant regulatory issues. One year of experience in the alternative energy field, including analysis of alternative fuel production and use.

Education

- University of California, Davis--Bachelor of Science, Mechanical Engineering and Materials Science
- University of California, Davis Extension Program--Renewable Energy Systems

Professional Experience

2007 to Present-- Mechanical Engineer, Energy Facilities Siting Division - California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

2006 to 2007--Energy Analyst, Fuels & Transportation Division - California Energy Commission

Performed analysis of use potential and environmental effects of emerging non-petroleum fuels, including compressed natural gas, biomass, hydrogen and electricity, in heavy and light duty transportation vehicles. Contributor to Energy Commission's alternative fuels plan.

DECLARATION OF
Andrew Collison

I**, Andrew Collison** declare as follows:

1. I am presently employed as a consultant to the California Energy Commission in the **Siting OFFICE** of the Systems Assessments and Facilities Siting Division as a Project Manager/Senior Technical Specialist IV.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Soil and Water Resources**, for the Genesis, Palen, Calico, Rice and Blythe Solar Power Plant applications, based on my independent analysis of the Petition to Amend the project and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

Andrew Collison, Ph.D.

Principal / Senior Geomorphologist

Dr. Collison is a geomorphologist and hydrologist with fifteen years experience working with sediment transport, geomorphology and hydrology issues. His particular areas of interest are aeolian geomorphology, sediment transport assessments, river channel design and restoration, floodplain restoration, multi-objective flood management and hydrograph modification management. He has worked on projects on the West Coast from Northern Washington to the Mexican border, as well as the Southeastern USA, Europe and South East Asia. Dr. Collison sits on several independent scientific advisory panels including those for the State Water Resources Control Board's Hydromod Squad, the Southern California Wetland Recovery Program, the Southern California Coastal Watersheds Research Program Hydromod Panel and San Francisco Estuary Institute's Napa River project. He is a co-author of the SWRCB's 401 Training Manual and developed and taught the State Board's bank stability training course. Prior to PWA, Dr. Collison worked on erosion and sediment transport issues at the USDA Agricultural Research Service's National Sedimentation Laboratory for 2 years. Following his PhD he was appointed as a geomorphology professor at King's College, University of London, England for 7 years.

Education

Ph.D. 1993	Department of Geography, University of Bristol, Bristol, UK. Effects of vegetation on hillslope stability
B.S. 1989	Department of Geography, University College London, London, UK. Included classes in desert geomorphology and arid environments, basic geomorphology, applied geomorphology and geoarchaeology.

Selected Project Experience

Sediment Transport

Smugglers Gulch Sedimentation, Tijuana Estuary, 2004. For California State Parks. Project Manager and Geomorphologist. PWA reviewed hydrology, hydraulic and sediment transport data to look at the potential impact of the Border Fence and cross-border flows from Mexico on the Tijuana River and its Estuary.

North Coast Regional Water Quality Control Board Independent Scientific Review Panel, 2002-03, Humboldt, CA. The independent panel reviewed existing data on logging, flooding and sediment erosion and deposition in five Humboldt watersheds, including Bear Creek. The panel was convened under an agreement by PALCO and the Regional Board. Findings were used by the Regional Board in its evaluation of water quality protection and acceptable timber harvest limits in Humboldt.

Sediment Transport and Sediment Management on the Pájaro and San Benito Rivers. For the Pájaro River Watershed Flood Prevention Authority. Project Manager and lead geomorphologist. The Pájaro River is the subject of a proposed flood plan that is threatened by potential difficulties obtaining permits for sediment removal. Dr. Collison led three studies into sediment transport in the Pájaro River and its principal tributary and sediment source, the San Benito River. The studies involved one and two dimensional sediment transport modeling to identify the source and rate of sediment delivery, the fate of sediment and the effects of redesigning the flood project to better manage sediment. The recommendations of the study have led to a redesign of the USACE flood project.

Lower Sacramento River Regional Project: Geomorphic Assessment, CA, 2003-2005. For SAFCA. Led the assessment of the anticipated geomorphic impact of proposed changes to the regional flood management of the Sacramento River and its tributaries and bypasses. Conducted sediment transport analyses of the potential scenarios.

Identifying the Source, Rate and Fate of Sediment in the Laguna de Santa Rosa, Sonoma Co., CA, 2002-04. For US Army Corps of Engineers. Project Manager and lead geomorphologist. The Laguna de Santa Rosa is an ecologically important wetland and also functions as a flood water store, reducing flood potential on the Russian River. Both roles are threatened by accelerated sedimentation rates. PWA carried out a watershed assessment of sources, production rate, and delivery processes for sediment in the Laguna watershed, to help inform and prioritize management of the area.

Channel Design and Restoration

Newhall Ranch Geomorphic Assessment and Natural Channel Design, Los Angeles County, CA. 2006-2009. For Newhall Land and Farming Company. Dr. Collison is the lead geomorphologist and channel designer on this project, which involves assessing existing channel geomorphic conditions and developing design plans for five creeks to mitigate for the effects of hydrograph modification following development. The creeks have to combine flood control, mitigation needs and aesthetic conditions in this high visibility setting adjacent to the Santa Clara River. The design approach has to comply with LA County DPM and LA RWQCB standards as well as regulatory agencies such as LA COE and CDF&G. The project involves channel geomorphic assessment, hydraulic studies, sediment transport modeling and channel design.

Kellogg Creek Fish Passage Improvement Project, Calistoga, CA, 2008-09. For the Peter Michael Winery. Project Director. Kellogg Creek flows through Peter Michael Winery and has some of the best spawning and rearing potential for steelhead and possibly coho salmon in the Russian River watershed. This is countered by four flow diversion weirs that are partial barriers to fish migration. PWA will design solutions to enhance fish passage over the weirs by retrofitting them and creating higher tailwater pools. Phase I will explore water rights impacts, phase II will focus on design. Phase II will consist of concept and plan development.

Carroll Canyon Creek (Los Peñasquitos Creek Watershed) Channel Design, San Diego County, CA. 2006-09**.** For Vulcan Materials. Dr. Collison is the project manager and geomorphology lead for the design of a restored channel through what is currently a gravel mine. The geomorphic approach was to conduct historic research on the setting and channel form, identify watershed factors that had changed (sediment and water regime) and develop conceptual approaches for a new channel that would be in equilibrium with the changed watershed.

San Clemente Dam Removal Feasibility Study & Conceptual Design, Monterey, 2007-08. Project Manager and Lead Geomorphologist. For California Coastal Conservancy. PWA developed a conceptual restoration design for a channel to bypass the San Clemente Dam with the aim of allowing steelhead migration and natural sediment transport. The design was tested for geomorphic stability, sediment transport characteristics and fish passage by developing a detailed hydraulic model and running continuous flow data for a six year period to assess performance in a wide range of flow conditions.

Pájaro River Riparian Corridor Restoration, Santa Clara Co., CA, 2006-08. For The Nature Conservancy. Project Manager. PWA has developed a restoration plan for a 4 mile riparian corridor and creek restoration of the Pájaro River near Gilroy. A key component has been to enhance an existing steelhead migration corridor and to enhance riparian and channel habitat while preventing flooding in the surrounding areas.

Jacques Gulch Channel Restoration, Santa Clara County, CA, 2006-08. For SCVWD. Project Manager and Geomorphologist. PWA conducted a geomorphic assessment and developed design drawings to remove mercury-laden mine tailings and restore a natural channel.

Chorro Creek Long Term Restoration and Management Plan, **San Luis Obispo County**, 2004-2009. For California Dept. of Fish & Game and the Morro Bay National Estuary Program. Project Manager and geomorphology lead. PWA is developing a plan to restore the creek and floodplain, and to trap sediment that would otherwise pass into Morro Bay Estuary. As well as managing the project Dr. Collison is leading the channel assessment and restoration conceptual design components, which involve floodplain regrading, in-stream habitat structures and bank stabilization.

Dry Creek Dam Removal, Napa, 2006. For Napa County RCD. Project Director. PWA conducted field surveying, constructed a hydraulic model and developed a conceptual design for the removal of a low diversion dam on Dry Creek. A key part of the project was to assess the potential for the dam removal to allow downstream channel erosion from an incised reach to propagate upstream. PWA's design involved replacing the dam with a boulder step-pool to prevent this from happening.

Napa River Restoration Design, 2003-05**.** For Rutherford Dust Society. Project Manager. PWA conducted a geomorphic assessment of 4 miles of the Napa River and developed a conceptual design to address habitat restoration and bank erosion. The target species included Chinook salmon and Steelhead trout. A key component was working with a diverse private landowner group to achieve consensus on the project approach. PWA is currently working with the California Land Stewardship Trust and the Yountville landowners group to complete the next 9 miles of creek restoration design.

River and Floodplain Restoration in Grizzly Slough, Sacramento Co., CA, 2004-2005 For DWR/CALFED. Lead geomorphologist. DWR is seeking to reconnect and restore a portion of floodplain in the confluence of the Cosumnes and Mokelumne Rivers, to recreate natural levee and tidal slough habitat and enhance floodplain physical and biological processes. We have established the historic and current geomorphology of the site, and are using one and two-dimensional hydraulic and sediment transport models to evaluate levee breach scenarios.

Restoration of Las Flores Creek, Malibu, 2004. For the City of Malibu. Lead geomorphologists. Las Flores Canyon is a steep coastal canyon that drains to the Pacific Ocean near Malibu. It has been impacted by fires, floods and a large landslide that moved the channel across the valley floor. PWA developed a restoration plan to stabilize the creek and reduce erosion of the landslide toe by the creek. The plan involved a hydraulic and geomorphic study of the canyon, and a preliminary restoration design.

Restoration of Tallac and Taylor Watershed and Wetlands, Lake Tahoe, CA, 2003. For US Forest Service Lake Tahoe Basin Management Unit. Geomorphology Lead. The geomorphic, hydrologic and ecologic functions of this important wetland are believed to be impaired due to disturbance in the watershed. Dr. Collison led the watershed geomorphic assessment to assess existing conditions and historic function of the wetland and wider watershed, leading to a restoration design.

Sacramento River National Wildlife Refuge Floodplain Channel Restoration, 2003. For DWR and The Nature Conservancy. Lead geomorphologist. PWA assessed the historic geomorphic change of the floodplain, and carried out hydraulic and sediment transport modeling leading to a conceptual design to restore historic floodplain back channels. The channels will restore river-floodplain interactions along the Sacramento River, as well as relieving flooding in an adjacent State Park.

Design of a Step-Pool Channel for Lincoln Creek, Auburn, CA. For City of Auburn. Lead geomorphologist. As part of a plan to daylight a culverted creek in a new city park, PWA designed a step-pool channel for a steep valley in the Sierra foothills. The project involved identifying suitable channel and material dimensions and ensuring that the resulting design would be stable, ecologically beneficial and appropriate to the land use and setting.

Designing a Fish Rearing Channel, Skagit River, WA, 2003. For City of Mt Vernon. PWA designed a back channel to provide fish rearing habitat and reduce stranding risk in Edgewater Park, Mt Vernon. We used a 2D hydraulic and sediment transport model to optimize our design, ensure the channel was stable and create the best hydraulic conditions for salmonids.

Redwood Creek Restoration, Marin, 2003. For NPS/GGNRA. Geomorphologist. Assessed the final field installation of large woody debris restoration structures and made field modifications in final location.

Flood Management

Feather River Levee Setback Project, Yuba Co., CA, 2007-09. For TRLIA. PWA assessed the geomorphic and sediment transport effects of a proposed 10-mile long levee setback and developed channel and floodplain restoration designs for the setback area, to enhance a flood control project along the Feather River. When completed the project will be the largest levee setback in California.

York Creek Flood Study, Napa Co., CA, 2008**.** For Beringer Winery/California Land Stewardship Institute. Project Director on a flood study to develop ways of reducing the flood risk for a winery located on York Creek.

Bear River Levee Setback Project, Yuba Co., CA, 2006-07. For TRLIA. PWA assessed the geomorphic and sediment transport effects, and provided designs for ecological features, for a 2 mile levee setback at the confluence of the Bear and Feather Rivers. The project was awarded the 2008 ASCE California Region Flood Control Project of the Year.

Hydromodification

San Diego County Hydromodification Program, 2008-09. Geomorphology lead. Led the work to develop flow control criteria for the HMP. The work involved continuous rainfall-runoff modeling for test watersheds, with the results being fed to almost three hundred hydraulic and sediment transport models to test channel vulnerability to stormwater. Based on these results we were able to test potential flow control standards for the HMP.

Developing Safe Flow Release Standards to Protect Creeks, Alameda County, CA. 2007-09 For East Bay Municipal Utility District (EBMUD). Geomorphology Lead. EBMUD periodically releases water from storage facilities into creeks, raising the potential for clean-water scour in receiving streams and triggering concern from the RWQCB. PWA adapted hydromod methods developed for the SFD Bay counties to assess the risk of a receiving water eroding and allow non-damaging releases to be calculated.

Southern California Coastal Watershed Research Project (SCCWRP) Hydromod Project 2007 – present. Dr. Collison is a member of the Technical **Advisory** Group for the Hydromod project that SCCWRP is conducting. The work will provide background research and help develop assessment tools for the HMPs that are taking place in Southern California.

Contra Costa County HydroModification Program, 2004-06. For Contra Costa County. Geomorphology lead. Developed the decision support tools and procedures to be **used** in the County's HMP plan for assessing stream vulnerability to hydrograph modification. The procedures developed in this project will form the basis for future permit applications in the county.

Bank & Channel Erosion

Vino Farms Bank Erosion Assessment, Healdsburg, 2006. For Russian River Streamkeeper and Trout Unlimited. Project Manager and Lead Geomorphologist. PWA was asked to assess a proposed bank stabilization design for the confluence of Dry Creek and the Russian River. We performed a historic channel evolution assessment and reviewed hydraulic data. Based on our analysis the design was modified to be more effective and to have a lower impact.

Winter Creek Channel Stabilization, Berkeley, CA, 2006-07. For UC Berkeley. Lead Geomorphologist. Winter Creek is a steep headwaters stream in the Berkeley Hills. In the last three years it has undergone rapid downcutting, leading to bank erosion and the loss of rare specimens in the UC Berkeley Botanical Gardens. PWA has developed a plan to stabilize and restore the creek. The plan involved estimating an equilibrium channel gradient for the changed watershed conditions and designing a series of rock step-pool structures to gain elevation between the graded reaches.

Assessing the Bank Stability and Calculating Setback Requirements for the South Fork Coquille River, OR. 2005. For Clearwater BioStudies Ltd. Lead geomorphologist. The S.F. Coquille has been straightened and is gradually reverting to a more sinuous course. In order to predict the impact that this will have on bank erosion PWA used a combination of bank stability modeling and erosion modeling. To estimate the required setback that would be needed to accommodate river evolution we developed a sine generated meander model. The results were used to develop a river management plan.

Poggi Canyon, Chula Vista, CA. 2004-05. For City of Chula Vista. Geomorphic assessment and design of a series of step-pools to retrofit a channel undergoing erosion from hydrograph modification impacts.

Assessing the Impact of Warm Springs Dam on Bank Erosion in Dry Creek, Sonoma, 2003. For Sayre & Wilson, Attorneys, CA. Lead geomorphologist and Project Manager. Since the closure of Warm Springs Dam landowners on Dry Creek have experienced bank erosion and loss of vineyard property. PWA developed a hydraulics and erosion model to assess the impact of flow regulation on bank erosion, and provided evidence for expert testimony in the resulting law suite.

Miscellaneous Projects

Geomorphic Assessment of Corte Madera Creek, Town of Portola, CA, ongoing. For Town of Portola. Lead geomorphologist. Corte Madera creek is an urban stream for much of its length, and has been extensively patched by ad-hoc stabilization efforts undertaken by individual property owners. The Town of Portola hired PWA to assess the larger scale pattern of geomorphic channel evolution, and to devise more environmentally-friendly and sustainable stabilization strategies. We assessed six miles of creek to identify channel conditions, stabilization efforts and the trajectory and evolution of the system. We then developed and wrote a series of stabilization plans for landowners in different parts of the system, so that owners can use better methods when they next undertake a creek project. We are in the process of setting up a series of ‘Creek walks’ to educate and inform the people of Portola about the creek and how they can be good stewards.

Putah Creek Dam and Sedimentation Management Project, Solano County Water Agency, 2004. Lead geomorphologist. The operation of Lake Solano is hampered by a high tailwater effect downstream, caused by sediment deposition and vegetative growth. PWA was hired to develop potential remedies. Our historic assessment showed that the main cause was a transition from an ephemeral river with high flushing flows that suppressed channel vegetation growth. We have developed a series of conceptual alternatives including dam removal that will address the sediment and hydraulic problem in an environmentally sustainable way.

401 Permit, and Bank Stabilization Training for State and Regional Water Quality Control Board Staff, CA, 2004. For UC Davis Extension Service. Task Manager and Geomorphology lead. PWA helped to develop the curriculum, wrote a manual, and provided the hydrology and geomorphology component of a training package for Board Staff. The courses, run through UC Davis, provides staff with training in channel and watershed geomorphology so that they can make well-grounded decisions with regard to 401 Permit applications and mitigation requirements.

Watershed Stewardship Initiative, Santa Clara, CA, 2003-05. For SCVWD. Project manager and technical lead for geomorphology and hydrology component. PWA is the lead on the geomorphology and hydrology components of this project to assess all 18 watersheds between the Guadalupe River and San Francisquito Creek, and to develop more detailed stewardship plans for two watersheds. We used a combination of GIS and field survey methods to rapidly and economically evaluate all 18 watersheds, and developed a selection system to identify the best candidates for more detailed analysis and stewardship. We then carried out more detailed geomorphic assessments on 8 miles of Stevens and Calabazas Creeks. Finally we carried out a fish barrier assessment and developed conceptual plans to overcome barriers on Stevens Creek. The work has involved working closely with the client and a large stakeholder group to develop the most appropriate watershed and creek analysis tools to meet the District's policies.

Brown Ranch Habitat Mitigation, Contra Costa County, CA. 2006-07. For H.T. Harvey & Associates. Project Manager. Brown Ranch is currently a cattle ranch, but has been identifies as a potential mitigation area for a development in Contra Costa. PWA conducted a hydrologic and geomorphic assessment and developed preliminary design plans for six wetlands and ponds for California Tiger Salamander and California Red Legged Frogs. The project involved conducting water balances to identify whether small drainages could support wet conditions during the required periods for the species in question.

Experience Prior to PWA

Predicting the Impact of a Simulated Spring Flow on the Missouri River, MT, 2002. For Coordinated Resource Management Group, Culbertson, MT. Numerical modeling and project management. As part of the rewriting of the Master Manual, the U.S. Army Corps of Engineers proposes a synthetic spring flow release from Fort Peck Dam to trigger spawning of Pallid Sturgeon. However, current flow releases have had an adverse effect on bank erosion, causing loss of farmland and disruption of water supply inlets. Modeling has been carried out to assess the impact of the proposed flow release on bank and toe erosion rates.

Dam Removal with Contaminated Sediments, Kalamazoo River MI, 2002. For USGS/EPA. Site assessment and project supervision on an EPA Superfund cleanup. Two dams on the Kalamazoo River have been lowered to the sill, leading to stream incision into reservoir deposits containing PCBs. A complete dam removal is proposed, which it is anticipated will cause further incision and erosion. Dr. Collison took part in the site assessment and helped guide the geotechnical investigation of the streambanks and bed. He co-developed the channel erosion and bank stability model used to predict the amount of contaminated sediment that will be released for several management scenarios and a no-action option.

Bank Stabilization, Little Blue River, KS, 2002. For Kansas Department of Health and Environment. Geotechnical investigation, riparian vegetation assessment and bank stability modeling. Since the 1980s banks on the Little Blue River have experienced 20-50 m of bank retreat over an 8 km reach, destroying farmland and releasing contaminated sediment. The banks will be stabilized using submerged vanes and riparian vegetation. This project is providing guidance on bank stability issues, optimum vegetation species for stabilization, and predicting the amount of contaminated sediment that will be released before stability is achieved.

Riparian Vegetation Assessment, Willamette Valley, OR, 2001. For U.S. Fish and Wildlife Service. Supervised investigation of riparian species for streambank stabilization and management. Streams in the Willamette Valley are subject to changes in riparian cover as part of a diverse range of management approaches. This project evaluated several common species to identify those with the most desirable characteristics and to assess the effects of removing some undesirable species. The information has been disseminated at the U.S. Forest Service Region 6 Watershed Restoration Workshop, and to U.S. Fish and Wildlife Service refuge managers in Oregon.

Bank Stabilization and Large Woody Debris, Yazoo River Basin, MS, 2001. For U.S. Army Corps of Engineers. Designed and supervised installation and long term monitoring of a test site to assess bank-dewatering techniques above LWD structures. The objective of the project was to test out low-cost dewatering techniques to be used for temporary bank stabilization while LWD and other approaches were coming into effect. Worked with Dr. Doug Shields in construction and monitoring of LWD structures.

Design for Vegetated Side Inlets, Yazoo River Basin, MS, 2001. For U.S. Army Corps of Engineers. Hydrologic and geotechnical modeling. Agricultural runoff from the Yazoo River Basin is a major source of sediment for the lower Mississippi. Channel incision has left fields elevated above the main drainage lines, prompting gully erosion in field drainage. Vegetated side inlets can provide a low-cost means of draining land without causing erosion, but they often fail due to mass movement and gully development. Dr. Collison carried out hydrology and geotechnical modeling to identify the optimum design of side inlet that would minimize these problems.

Geomorphic Assessment of Channel Erosion, Lake Tahoe Basin, CA/NV, 2002. For USDA National Sedimentation Laboratory. Lead geomorphologist. Conducted field assessments of fifty-four channels in the Tahoe Basin to assess geomorphic condition and channel processes, as part of a project to determine the contribution of bank erosion to sediment problems in Lake Tahoe.

Prioritizing Grade Control Structure Placement, Yazoo River Basin, MS, 2000-01. For U.S. Army Corps of Engineers. Field monitoring and numerical modeling of clay bed streams to estimate rate of knick point retreat and channel instability. Developed finite element modeling strategy and supervised modeling activities to help client identify critical reaches in river system.

Design of a Low Flow Channel, Small River Lea, London, UK, 1998. For UK Environment Agency. Principal geomorphologist and designer. As part of a flood control project for an urban area, the client wanted to construct a low-flow channel with improved habitat and water quality. Carried out a hydraulic analysis to identify suitable stable channel dimensions and bed material. Produced channel cross-sections, long profile and specifications for bed material size.

Impact of Climate Change on Landslide Frequency, SE England, UK, 1998**.** For European Union DGVII (Environment Directorate). Project leader – hydrologic modeling and UK impacts. Climate change is projected to affect the amount, frequency and distribution of rainfall in Europe. This project evaluated the impact of such changes on landslide frequency and magnitude across Europe. Dr. Collison's role was to lead an international team of hydrologists to develop models of landslide hydrology for application throughout Europe, and to head up the UK team assessing the impact of landslides specifically in the UK.

Selected Journal Articles

Simon, A. and Collison, A.J.C 2002. Quantifying the mechanical and hydrologic effects of riparian vegetation on streambank stability. *Earth Surface Processes And Landforms*., 27(5), 527-546

Simon, A, and Collison, AJC. (2001) Pore pressure effects on the detachment of cohesive streambeds: seepage forces and matric suction. *Earth Surface Processes and Landforms*. 26, 1421–1442

Collison, AJC. (2001): The cycle of gully head retreat: slope unloading and fissure flow as controls on gully head failure. *Hydrological Processes*, 15(1), 3-13.

Collison, AJC, Wade, SD, Griffiths, J. & Dehn, M. (2000): Modelling the impact of predicted climate change on landslide frequency and magnitude in SE England. *Engineering Geology*, 55(3), 205-218.

Collison, AJC, and Anderson, MG (1996): Using a combined slope hydrology and stability model to identify suitable conditions for landslide prevention by vegetation cover in the humid tropics. *Earth Surface Processes And Landforms*, 21, 737-747.

Collison, AJC, Anderson, MG & Lloyd, DM. (1995): The impact of vegetation on slope stability in a humid tropical environment - a modelling approach. *Proceedings of the Institute of Civil Engineers*: *Water, Maritime and Energy*, 112, 168-175.

Brooks, SM, Anderson, MG & Collison, AJC (1995): Modelling the role of climate, vegetation and pedogenesis in shallow translational hillslope failures. *Earth Surface Processes and Landforms*, 20, 231-242.

Chapters in books

Collison, A., Pollen, N. and Simon, A. 2005. The effects of riparian buffer strips on streambank stability: root reinforcement, soil strength and growth rates. In: Zobel, R.W. (Ed.) Roots And Soil Management : Interactions Between Roots And the Soil, Soil Science Society of America.

Pollen, N., Simon, A., Collison, A. 2004. Advances in Assessing the Mechanical and Hydrologic Effects of Riparian Vegetation on Streambank Stability. In: Bennett, S.J., Simon, A., Editors. Riparian Vegetation and Fluvial Geomorphology. American Geophysical Union, Washington, Dc. P. 125-140.

Collison, A. and Griffiths, J. 2004. Modelling Slope Instability. In: Wainwright, J. and Mulligan, M. (Eds.) Environmental Modelling: finding simplicity in complexity. Wiley: 197-210.

Collison, AJC. (1996): Unsaturated strength and preferential flow as controls on gully head development. In: Brooks, SM. & Anderson, MG. (Eds.): *Advances in Hillslope Processes*. Wiley: 753-770.

Brooks, SM, and Collison, AJC. (1996): The significance of soil profile differentiation to hydrological response and slope instability: a modelling approach. In: Brooks, S.M. & Anderson, M.G. (Eds.): *Advances in Hillslope Processes*. Wiley: 471-486.

DECLARATION OF
Mike E Daly P. E.

I, **Mike E. Daly**, declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. I am serving as a Senior Engineer and to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. My professional qualifications and experience are attached hereto and incorporated by reference herein.

3. I assisted in the preparation of the Staff Testimony and errata on **Soil and Water Resources** sections for the **Genesis Solar Power Project Revised Staff Assessment** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 7, 2010 Signed: _____

At: Santa Ana, California

Education

BS/1992/Hydrology and Water Resources/College of Engineering and Mines, University of Arizona

Registration

1999/Arizona Registered Professional Engineer/33984
2002/California Registered Professional Engineer/63340

Affiliations

American Water Works Association
Tucson Utilities Contractors Association

Experience

With Psomas for 12 years, with other firms for 5 years.

Background

Mike Daly has more than 17 years of experience in the field of water resource design. He currently manages a five-person team, which completes a variety of project types including watershed and floodplain studies, flood control mitigation studies, sanitary sewer and storm drain planning and design, potable water system planning and design, and utility coordination modifications.

Projects

North Park Improvement Plans, Town of Sahuarita Public Works Department, Sahuarita, Arizona: Mike was project manager for this effort which included preparation of improvement plans for four new effluent infiltration ponds and an adjacent public park consisting of soccer and baseball facilities, playground, and large parking area. A key component of the project was the analysis of offsite flows which were modeled using the FLO-2D due to the topography of the floodplain. The results of the analysis were used to aid the design of the improvements and a proposed conditions model was created and to verify no adverse impacts to adjacent properties due to floodplain encroachment.

Pantano Wash/Kolb Road Permanent Soil Cement Bank Protection, Pima County Regional Flood Control District, Tucson, Arizona: Mike was the Project Manager for this project to develop and compile a basis of design report with alternatives analysis for a permanent bank protection and channel stabilization on the Pantano Wash (Q_{100}=32,00 cfs) between Speedway Boulevard and Tanque Verde Road. Services included hydrologic, hydraulic, and sediment transport analysis and documentation for each alternative, as well as geotechnical and structural stability analyses. Soil cement grade control structures were also designed to mitigate and stabilize the Pantano Wash channel and invert from continued head cutting within the project area. Mike is also managing the formal soil cement bank protection design for the project which is currently 90% complete.

Mission West Wash Flood Control Study, Pima County Regional Flood Control District, Pima County, Arizona: As Project Manager, Mike oversaw the hydrologic and hydraulic analysis to assess existing flooding conditions and examine several alternatives to mitigate potential flooding of the San Xavier Estates subdivision. The existing conditions HEC-2 model developed as part of the study was modified to look at the effectiveness of such alternatives as raising an existing berm, widening an existing diversion channel, and constructing a levee to FEMA standards. The option of employing upstream detention was also addressed. Preliminary cost estimates for the various mitigation alternatives were also provided.

Alamo Wash, City of Tucson, Arizona: As Project Manager, Mike's responsibilities included overseeing the re-mapping of the existing floodplain within the project limits using revised 100-year peak discharges. Finished floor elevations (FFEs) were collected at all inhabitable structures within the existing FEMA floodplain to determine which structures could be removed from the effective floodplain based on their FFE. The results of the revised mapping and hydrologic analysis were submitted to FEMA in an application for a Letter of Map Revision (LOMR). Mike was also responsible for the preparation of formal design documents for the construction of bank protection for Alamo Wash from just upstream from the confluence with Van Buren Wash to the south side of Grant Road.

Drainage Erosion Mitigation Plan, Pima County Regional Flood Control District, Green Valley, Arizona: As Project Manager Mike contracted with Pima County Regional Flood Control District to provide an erosion mitigation plan at 16 distinct locations within Green Valley. The existing drainage system consists of numerous constructed drainage channels to convey large flows from natural upstream watersheds through developed areas and to the Santa Cruz River. Due to a lack of consideration of sediment transport characteristics during the original design, significant channel downcutting and bank mitigation has occurred in many of the drainageways. Psomas' scope of services included collection of survey data and the formulation of conceptual and formal design plans to be used by contractors to construct mitigation measures and correct existing erosion problems.

Master Drainage Plan, Phases I & II, Town of Sahuarita, Sahuarita, Arizona: As Project Manager, Mike was responsible for this multi-phased effort to identify, characterize, and establish mitigation alternatives for existing drainage problems within the town limits. The study focused on areas where development is occurring or is likely to occur and on the relationship between existing drainage patterns and the future infrastructure required to support this development. Specific tasks included peak discharge analysis, field reconnaissance, assessment of existing drainage infrastructure, conceptual plan development, and preliminary cost estimates.

San Xavier District Master Basin Study, Tohono O'ohdam Nation Pima County Flood Control District, Pima County, Arizona: As Project Hydrologist, Mike was responsible for the cooperative effort between Pima County and the Tohono O'ohdam Nation to identify and provide alternatives to mitigate widespread flooding and erosion problems at the reservation. The project scope of work included identification and documentation of existing problems, calculation of peak discharges using HEC-1 methodology, mapping of existing floodplains using HEC-2 methodology, and the

formulation of both structural and non-structural flood control alternatives, which were consistent with the Nation's long term goals and farm rehabilitation plan.

DECLARATION OF
Michael P. Donovan, P.G., C.Hg.

I, **Michael P. Donovan**, declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. I am serving as a Senior Hydrogeologist and to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. My professional qualifications and experience are attached hereto and incorporated by reference herein.

3. I assisted in the preparation of the Staff Testimony and errata on **Soil and Water Resources** sections for the **Genesis Solar Power Project Revised Staff Assessment** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 7, 2010 Signed: Michael P. Donovan

At: Santa Ana, California

Education

BS/1978/Geology/Oregon State University

Computer Modeling of Groundwater Flow and Contaminant Transport by Jacob Bear/University of California, Irvine

Registration

1986/California Registered Geologist #4112 (Expires 06/30/11)

2000/California Certified Hydrogeologist #701 (Expires 06/30/11)

Experience

With Psomas 5 years; with other firms for 24 years.

Background

Mr. Donovan is a professional hydrogeologist with over 29 years of experience in project management, hydrology and hydrogeological assessments, conceptual model development, groundwater modeling studies, water quality assessments, and groundwater resource development. He has extensive skills with monitoring well design, water quality sampling and analytical techniques, quality assurance/quality control, CEQA, environmental impact assessment, ecohydrology, agency negotiations, risk assessment, and expert witness.

Related Projects

San Juan Basin Authority (2004-Present): Senior Hydrogeologist – Hydrogeologic characterization and monitoring of groundwater extraction as part of desalination facility. Project includes implementation of groundwater monitoring plan including water quality sampling and analytical testing, groundwater modeling, monitoring of surface and groundwater levels and flow and assessments in change in storage to the alluvial groundwater basin from ongoing extraction wells. In addition, evaluated recharge of alluvial groundwater system using diverted stream channels and percolation basins for ongoing desalination project.

Metropolitan Water District of Southern California: Senior Hydrogeologist – Hydrogeologic characterization of bedrock geology in vicinity of proposed Pipeline No. 6 water conveyance tunnel. Work included development of monitoring plan including sampling protocols, laboratory analytical techniques, and quality assurance and quality control procedures.

Private Developer, Hydrogeologic Assessment (2004 to Present): Senior Hydrogeologist - Hydrogeologic characterization of Shaver Valley (east of Indio, CA) for potential conjunctive use project as part of major residential, commercial, and golf resort development in Eastern Riverside County. Work includes workplan development, geophysical investigation, well installation, aquifer testing, water quality assessment, groundwater modeling, conceptual design of groundwater recharge/extraction program, and providing documentation for Specific Plan and EIR.

Mission Springs Water District, Groundwater Modeling Study (2005-Present): Senior Hydrogeologist –The work included potential historical impacts to regional groundwater system, potential reuse sites for recycled water, and recommendations for a Groundwater Management Plan.

Poseidon Resources, Hydrogeological Assessment: Senior Hydrogeologist – Preparation of Hydrogeological Assessment and Feasibility for the use of vertical extraction wells to supply feedwater for a desalination plant in Southern California. Evaluation included characterization of nearshore hydrogeological regime and design of extraction wells and potential drawdown field created by maximum feasible yield.

Mission Springs Water District, Preliminary Water Balance: Senior Hydrogeologist - Hydrogeologic characterization and water supply assessment for the Mission Springs Water District (MSWD) service area. The objective of this project is to develop a long term Integrated Water Resource Management Plan that can be used by MSWD to optimize the use of their groundwater basins and evaluate alternative water supplies. The alternatives developed must minimize impacts to biological and wildlife of concern by the local environmental community. As part of this project, Mr. Donovan completed a preliminary water balance study for the Mission Creek sub-basin. The results of the study would be used to direct future investigations for the Mission Creek sub-basin.

City of San Juan Capistrano (2007): Senior Hydrogeologist – Assisted the City of San Juan Capistrano in the evaluation of proposed well production sites including installation and testing of pilot test wells at two location. Evaluation included advancement of test borings using Sonic Drilling, well completion, aquifer test, water quality sampling, and preparation of Pilot Test Well Report that included suitability of each location and expected production from a production well placed at each location.

Elsinore Valley Municpal Water District (2006-2007): Senior Hydrogeologist - Meeks & Daley Water Company (M&D) and the City of Riverside constructed two new wells (in City of San Bernardino and Colton). Psomas was responsible for designing and preparing a preliminary design report, construction documents and project specifications for: two new +700-Foot deep wells with a vertical turbine pump assembly at an estimated flow rate of 3,000 GPM and associated piping. Mr. Donovan prepared a Mitigated Negative Declaration, Mitigation Monitoring and Reporting Program, required forms for submittal to State Clearing House, response letter to comments, and presentations to lead agency/public forum on the project.

East Orange County Water District (2008): Senior Hydrogeologist – EOCWD planned to construct a 900-foot deep well (in City of Tustin). Psomas was responsible for designing and preparing a preliminary design report, construction documents and project specifications for the new +900-Foot deep well with a vertical turbine pump assembly at an estimated flow rate of 2,000 GPM and associated piping. Mr. Donovan prepared a Mitigated Negative Declaration, Mitigation Monitoring and Reporting Program, required forms for submittal to State Clearing House, response letter to comments, and presentations to lead agency/public forum on the project.

Surface and Groundwater Assessment, Eastern Utah: Principal investigator for baseline surface water and groundwater assessment and impact monitoring of White

River Shale Corporation major oil shale mining project in eastern Utah. Responsible for locating over 8 surface water monitoring stations, streamflow monitoring (including static and continuous monitoring), development of rating curves for stream cross-sections, water quality sampling, reduction and analysis of data and development of a comprehensive data management system designed after the USGS WASTORE system over a period of seven years. In addition, developed a data quality management system that monitored and corrected deficiencies in the collection and reporting of the surface water quality data and later developed a statistical approach for evaluating mitigation monitoring for naturally-occurring compounds including metals and selected nutrients..

Surface Water Quality Monitoring, Southeast Alaska: Principal investigator for baseline surface water quality monitoring program for the Quartz Hill Molybdenum Project. Responsible for locating over 17 surface water monitoring stations, streamflow monitoring (including static and continuous monitoring), development of rating curves for stream cross-sections, water quality sampling (including storm-activated samplers), reduction and analysis of data and development of a comprehensive data management system designed after the USGS WASTORE system over a period of five years. In addition, developed a data quality management system that monitored and corrected deficiencies in the collection and reporting of the surface water quality data.

Surface Water Quality Monitoring, Thompson Creek Molybdenum Mine, Idaho: Principal investigator for baseline surface water quality monitoring program for a proposed fluorite mine project. Responsible for locating over 12 surface water monitoring stations, streamflow monitoring, water quality sampling, data analysis and reporting of the information over a period of two years.

Surface Water Quality Monitoring, Ima Mine, Idaho: Principal investigator for baseline surface water quality monitoring program for tungsten mine project. Responsible for locating over 5 surface water monitoring stations, streamflow monitoring, water quality sampling, data analysis and reporting of the information over a period of two years.

Surface Water Quality Monitoring, Bayhorse Creek Mine, Idaho: Principal investigator for baseline surface water quality monitoring program for a proposed fluorite mine project. Responsible for locating over 12 surface water monitoring stations, streamflow monitoring, water quality sampling, data analysis and reporting of the information over a period of two years.

Surface and Groundwater Quality Monitoring Program, Equity BX In-situ Oil Shale Mine, Colorado: Principal investigator for mitigation monitoring of surface water and groundwater quality during operation of a pilot test program for steam injection removal of oil from oil shale. Responsible for locating over 4 surface water and 8 groundwater monitoring stations, streamflow monitoring, water quality sampling, data analysis, impact evaluation and reporting of the information.

Surface Water Quality Monitoring, Creede, Colorado: Principal investigator for baseline surface water quality monitoring program for Chevron's proposed silver mine project. Responsible for locating over 12 surface water monitoring stations,

streamflow monitoring, water quality sampling, data analysis and reporting of the information.

Private Developer (2007): Principal Hydrogeologist. Evaluated the feasibility of constructing a golf course and adjacent housing complex on a closed landfill in Riverside County, California. The work included reviewing technical documents, meeting with regulators and developing issues environmental constraints list with recommendation for further study.

Valley Center Residential Project, CA (2005): Senior Hydrogeologist for hydrogeological characterization that included aquifer tests, water quality sampling and analysis, and numeric groundwater flow model development for a proposed residential development project in Valley Center. The project required analyzing the effect of wastewater effluent on the local groundwater aquifer and developing mitigation measures as required.

Sacramento Regional County Sanitation District, Peer Review – Hydrogeological Assessment: Project Manager/Senior Hydrogeologist – Conducted a review documents associated with the dewatering activities conducted during construction activities that occurred at the New Natomas Pump Station and evaluate whether "actual conditions are more adverse than baselines" were present. The evaluation included site walk, review of aquifer testing data and methods, dewatering activities, existing hydrogeological data and preparation of a report on findings.

Mission Springs Water District, Urban Water Management Plan: Senior Hydrogeologist – Preparation of the Hydrogeological portions of an Urban Water Management Plan in compliance with The California Water Management Planning Act of 1983, which required water purveyors to develop water management plans to achieve conservation and efficient use.

Remedial Investigation, Los Angeles, California: Senior Hydrogeologist and Project Manager responsible for interpreting existing information and developing a geologic and hydrogeologic evaluation program for a former chromium-plating facility. The facility is adjacent to a former major manufacturing facility that used chlorinated solvents and hexavalent chromium in its manufacturing operations. Responsibilities included reviewing historical site investigation activities, preparing a remedial investigation workplan, implementation of the workplan, commenting on adjacent facilities' workplans, California Environmental Protection Agency DTSC meetings and negotiations, and formulating arguments/briefs for impending mediation.

Superfund Oversight, City of Industry, California: Senior Hydrogeologist responsible for participating as the client's technical representative to the Puente Valley Operable Unit Steering Committee. Responsibilities included reviewing historical site investigation activities and preparing a de minimis argument for the client's facility, assessing offsite liability stemming from adjacent responsible parties, reviewing proposed activities of the Steering Committee's consultant, and formulating arguments/briefs for impending mediation.

Remedial Investigation, Redlands, California: Principal investigator for Lockheed Corporation, a rocket motor manufacturing and testing facility. The purpose was to identify potential source areas of TCE contamination. Areas evaluated included burn

pits, leachfields, vapor degreasing units, evaporation ponds, solid propellant mixing areas, rocket motor testing areas, and painting areas. The evaluation involved ranking the potential of various manufacturing activities to act as a source of TCE and evaluating available pathways into existing groundwater systems.

Site Investigation for Southern Pacific Pipeline. Palm Springs, California: Senior project manager for a site investigation of a fuel leak for this major fuel product transport line. The site investigation included developing soil sampling and field screening techniques, shallow probe installation and groundwater monitoring well installation and sampling. The initial investigation culminated in development of potential remedial alternatives.

Xerox Corporation, Pomona, California: Senior Hydrogeologist for the design, implementation, and interpretation of a remedial investigation of a 12-acre former electronics manufacturing facility. Responsibilities included design and implementation of remedial investigations at the site, operation and maintenance of groundwater treatment system, groundwater monitoring, soil and groundwater cleanup evaluation, regulatory interaction, preparation of demolition specifications, bid documents, selection of subcontractor, and monitoring execution of the demolition program. In addition, provided technical support to outside legal counsel for civil liability lawsuit filed in association with the aforementioned site.

Recovery of Past Investigation Cost Claims, San Diego, California: Senior hydrogeologist for a client who was seeking reimbursement from a previous site operator for site investigation and remedial action costs. Reviewed with legal counsel the costs associated with various activities and segregated into costs that were viable for cost recovery. Provided testimony in court case and was successful in recovering 80% of past costs.

Redevelopment Project, San Diego, California: Project Manager responsible for the environmental assessment associated with the demolition of a bus maintenance facility and construction of multi-story apartment complex at a site severely impacted with petroleum hydrocarbons. The activities included reviewing prior site investigations conducted by five previous consulting firms, delineating areas of concern for excavation activities, conducting focused site investigations on the property, and formulating proposed alternatives for handling petroleum-contaminated soils during site construction.

Xerox Corporation, Santa Clara, Sunnyvale, & Hayward, California: Senior Hydrogeologist for the successful development and implementation of a site closure plan. Responsibilities included interpretation of hydrogeology and contaminant transport, groundwater monitoring, preparation of a site closure plan including hydrogeologic evaluation, fate and transport of chlorinated volatile organic compounds, and negotiations with the regulatory agencies.

Remedial Investigation, Carson, California: Program manager for remedial investigation/feasibility study at a 30-acre chemical-manufacturing site in southern California. The activities conducted at the site included soil vapor surveys, soil sampling, and groundwater sampling (three separate aquifer systems). The program also involved development of a feasibility study work plan, risk assessment evaluation, and public participation plan.

Remedial Investigation, Sacramento, California: Principal investigator for preliminary endangerment assessment and remedial investigation at a large aerospace facility. The 4,000- acre former rocket test facility is currently undergoing soil and groundwater investigations for potential releases of chlorinated solvents and metals. Responsible for developing the remedial investigation tasks and implementation.

Remedial Investigation/Feasibility Study, San Diego, California: Senior hydrogeologist responsible for design and implementation of all site characterization activities including design and implementation of the RI/RFI at a major gas turbine manufacturing facility. The work included assessment of soil and groundwater impacted with chlorinated solvents, metals, benzene, petroleum hydrocarbons and PCBs. Assisted in preparation of a comprehensive RI/RFI work plan that included a historical summary of facility operations, site geology and hydrogeology, and contaminants of concern, and the proposed site characterization activities to be undertaken. Site characterization activities included advancement of borings and completion of wells using hollow-stem auger and casing hammer reverse air circulation drilling; soil vapor surveys; geophysical investigations including electrical and seismic; continuous water level monitoring to correct for tidal influence; and laboratory analysis using CLP protocols.

Six Flags Magic Mountain, Hydrogeological Assessment (2005-2006): Senior Hydrogeologist – Assistance with permitting requirements associated with construction of a bank protection structure along the Santa Clara River in northern Los Angeles County. Work included assessment of hydrogeological regime including water quality, preparation of creekside dewatering permit and negotiations with RWQCB.

Fate and Transport Evaluation, San Diego, California: Senior hydrogeologist for the RI/RFI fate and transport evaluation to determine the necessity for implementing interim remedial measures for the transport of chlorinated volatile organic compounds and metals off-site into marine waters.

Feasibility Study, United States Navy, British Indian Ocean Territories, Indian Ocean (1984): Principal Investigator for enhancing development of groundwater resources on the island of Diego Garcia for the U.S. Rapid Deployment Force. The study included design and placement of horizontal infiltration galleries for development of a fresh groundwater lens.

Publications & Presentations

"Application Of Ecohydrology In Analysis And Minimization Of Development Impacts" Groundwater Resources Association of California 17th Annual Conference & Meeting; GROUNDWATER: Challenges to Meeting Our Future Needs. Sep. 25, 2008

"Hydrogeology of the San Diego Region on CD-ROM"
EnviroConcepts, Inc., March 2004.

"Hydrogeology of the Coastal Plain of Los Angeles on CD, Vol. II"
EnviroConcepts, Inc., March 2004.

"Hydrogeology of the San Fernando Valley on CD-ROM"
EnviroConcepts, Inc., August 2003.

"Hydrogeology of the Inland Plain of Los Angeles on CD-ROM"
EnviroConcepts, Inc., January 2003.

"Hydrogeology of the Coastal Plain of Los Angeles on CD, Vol. I"
EnviroConcepts, Inc., May 2002.

"Environmental Consultants' Resource Handbook (California Edition)." 600 pp.
EnviroConcepts, Inc., March 1998.

"Environmental Consultants' Resource Handbook (California Edition)." 561 pp.
EnviroConcepts, Inc., April 1995.

DECLARATION OF
John R. Thornton P. E.

I, **John R. Thornton**, declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. I am serving as a Senior Water Resource Engineer and to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. My professional qualifications and experience are attached hereto and incorporated by reference herein.

3. I assisted in the preparation of the Staff Testimony and errata on **Soil and Water Resources** sections for the **Genesis Solar Power Project Revised Staff Assessment** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 7, 2010 Signed: _____

At: Santa Ana, California

Education

MS/1978/Civil and Environmental Engineering/California State University, Long Beach

BS/1969/Civil Engineering/California State Polytechnic University, Pomona

Registration

1974/Civil Engineer/California/#24251
1976/Agricultural Engineer/California/#145
1982/Civil Engineer/Nevada/#6160
1986/Civil Engineer/Idaho/#5379
1996/Civil Engineer/Arizona/#29954
2007/Civil Engineer/Utah/# 6674175-2202

Affiliations

Water Environment Federation
American Water Works Association
Orange County Water Association
Water Reuse (Vice President of Orange County Chapter)
Urban Water Institute (Member of Board of Directors)
Association of California Water Agency (Member of Groundwater Committee)

Experience

With Psomas for 14 years; with other firms for 27 years.

Background

Mr. Thornton has over 40 years of experience in the development and management of water resource projects ranging in scope and magnitude. He is an expert in the development and management of groundwater development and management projects. He has been in responsible charge of the preparation of feasibility studies and facilities master plans; preliminary and final design documents (construction drawings, specifications, and cost estimates); and construction supervision of canals, pipelines, wells, pump stations, reservoirs, reclaimed water use systems, and agricultural crop and landscaping irrigation facilities. He has also provided technical studies and expert witness testimony in complex water rights matters. The following are examples of projects he has been in principal charge:

Projects

San Juan Basin Authority, San Juan Capistrano, Ca (1990 to Present): District Engineer and Project Manager for the San Juan Basin Authority. Principal author of the 1994 groundwater management plan and water rights application that lead to obtaining a water Rights Permit to develop groundwater from the San Juan and Arroyo Trabuco Creeks and construction of the City of San Juan Capistrano's brackish water desalination plan. Successfully applied for and obtained four grants from CSWRCB. One of the grants was used to develop the Integrated Vegetation and Groundwater Monitoring Plan which was reviewed and accepted by the Division of Water Rights as meeting all of the

monitoring conditions of the water rights permit not only for the SJBA but also the requirements of the South Coast Water District Water Rights Permit. Implemented and provided overall management of the implementation of the Integrated Vegetation and Groundwater Monitoring Plan since its inception in 2004. Have successfully modified and or reduced several of the monitoring protocols as they were not applicable to the conditions within the monitoring area. Have provided water resource and engineering consulting expertise to the SJBA on numerous project since 1990.

Mission Springs Water District, Integrated Water Resource Plan: Principal in Charge to assist MSWD staff in the preparation of an Integrated Water Resource Plan and further develop a conceptual understanding of the conjunctive use and groundwater banking options potentially available in various locations within their service area. The first phase of the project focused on the development of a hydrologic water balance for the Mission Creek Sub-basin. Psomas' initial review resulted in the development of a comprehensive field investigation plan and implementation plan for a variety of alternatives that incorporated the water resource supply needs for future projected demands. The objective of the work effort was to address specific groundwater management options for the utilization and conservation of existing and potential water resources available to MSWD.

South Orange County Integrated Water Shed Management Plan: Principal in Charge of developing an IRWMP for South Orange County as part of the California Prop 50 and 84 bond financing program. The plan included the coordination of over 20 public agencies and stakeholders, the development of a plan with over 40 million dollars in projects largely related to water and wastewater development.

Antelope Valley Groundwater Banking Feasibility Study: Project Manager for investigating the feasibility of developing a conjunctive use project to facilitate the sale of State Project waters exchanged for banked groundwater in the westerly Antelope Valley of Los Angeles County. The banked groundwater would be sold to Los Angeles Department of Water and Power to replace water used for dust mitigation at the Owens Lake. The study reviewed the geologic, hydrogeologic, water supply, water quality, costs, environmental and institutional issues associates with the project; determined appropriate water supply, recharge, recovery and storage criteria; sized the facility and prepared cost estimates. A preliminary MODFLO model was developed. Operational criteria was developed for 20,000 to 40,000 acre feet per year of recharge, up to 40,000 acre feet of extraction, 200,000 acre feet of cumulative storage and service to and from both water supply facilities.

Hemet/San Jacinto Recharge and Recovery Program, Eastern Municipal Water District, CA: Project Director/Principal-in-Charge for the Eastern Municipal Water District Integrated Recharge and Recovery Program. Psomas worked with the EMWD and local stakeholders to evaluate the feasibility of using EMWD-owned property in the San Jacinto River bed as an integrated groundwater storage site. The feasibility program includes the analysis and evaluation of hydrogeologic properties, development of a regional groundwater model, preliminary design and location of proposed recharge basins and necessary facility infrastructure including extraction wells. In addition, coordination

coordination was provided for environmental support services for the EMWD overall Habitat Conservation Plan for this project and discussing the project with appropriate regulatory agencies such as the Army Corps of Engineers and United States Fish and Wildlife. The purpose of the proposed Program is to provide groundwater storage within the eastern portion of EMWD's service area (i.e., the Hemet/San Jacinto area).

Olancha Water Project, CA, Western Water Co: Project Manager for developing facilities and evaluating the feasibility of a water transfer project from the Southern Owens Valley, Owens Lake area. The project includes the development of a groundwater flow model (ModFlow) for approximately a fifty square mile area of the southern Owens Lake, evaluation of groundwater hydrogeology, evaluation of impacts to natural and cultural resources, location and preliminary design of facilities, including wells, pipelines and connection to the City of Los Angeles Owens Valley Aqueducts and overall project feasibility. Approximately 10,000 acre feet per year were estimated as feasible to extract from the groundwater without impacting farming, domestic water and natural resources. A complete EIR was developed including all necessary biological and cultural studies and initial processing through the planning department of Inyo County. A groundwater resource-monitoring plan was developed and implemented for monitoring water level and quality for over 20 wells in the surrounding area. The project was performed under careful review of the Inyo County Water Department.

Cadiz/Fenner Conjunctive Use and Storage Program, San Bernardino County, CA, Cadiz Land Co.: Project Manager for the development of preliminary engineering and economic analysis for a conjunctive use, water storage and transfer program located in Cadiz and Fenner Valleys of San Bernardino County. The project included 30 miles of large diameter pipeline. The Core Program could provide a dry-year water supply to the Metropolitan Water District of Southern California of up to 100,000-acre feet per year. The program concept is to convey Colorado River water from the Colorado River Aqueduct (CRA) to the Cadiz/Fenner area during periods of excess supply. The imported water would be stored in the local groundwater aquifer system. This water and indigenous groundwater would be extracted by wells and returned to the CRA during periods of drought.

DECLARATION OF
Candace M. Hill

I, Candace M. Hill, declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Protection Office of the Siting, Transmission, and Environmental Protection Division as a Planner II.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony and errata on the Revised Staff Assessment Traffic and Transportation section for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/4/10 Signed: Candace M. Hill

At: Sacramento, California

CANDACE M. HILL

PROFESSIONAL EXPERIENCE

CALIFORNIA ENERGY COMMISSION - December 2009 – Present
Siting, Transmission, and Environmental Protection Division, Sacramento, California
Environmental Planner II

- Review applications for power plants and solar electric generating facilities for transportation, land use, visual, and socioeconomic impacts.
- Write environmental analysis staff assessments.
- Attend workshops on authored technical sections.

DEPARTMENT OF TRANSPORTATION - December, 2008 – December, 2009
Division of Mass Transportation, Sacramento, California
Associate Transportation Planner

- Administered two Federal Transit Administration (FTA) Grant Programs – Job Access and Reverse Commute (JARC) and New Freedom (NF).
- Reviewed and assessed grant proposals, monitored and prepared weekly and bi-weekly status reports for both Programs, managed the day-to-day operations of the grants and budgets for transportation, capital, operating and mobility management grants administered through the Department of Transportation for District 4 and District 5 which covered 14 counties.
- Responded to inquiries from grant recipients and the general public regarding the grants.

DEPARTMENT OF CONSERVATION - May, 2000 – December, 2008
California Geological Survey, Sacramento, California
Associate Planner

- Met with staff of the planning, building, public works and engineering departments of affected cities and counties throughout the State to explain the requirements and implementation of the California Seismic Hazards Mapping Act in the land use development process such as the General Plan, Zoning Code, building process and the California Environmental Quality Act.
- Analyzed and commented on General Plan Draft Safety Elements to incorporate the Seismic Hazard Zone Maps into the Element; reviewed Tribal Land Applications for seismic impacts.
- Presented the Seismic Hazard Zone Maps before the State Mining and Geology Board and coordinated with the public affairs office, legislative office and other state departments regarding the issuance of the Seismic Hazard Zone Maps.
- Maintained a database of affected cities and counties.
- Point person for outreach events.
- Responded to public inquires regarding Zone Maps and general seismic hazards.

CANDACE M. HILL

SACRAMENTO COUNTY PLANNING DEPARTMENT July, 1999– May, 2000
Current Planning, Sacramento, California
Associate Planner

- Researched, analyzed and wrote staff reports for land use development proposals.
- Presented staff reports and recommendations for the land use development proposals to the Sacramento County Planning Commission and Sacramento Board of Supervisors.
- Staff Planner for the Cosumnes Community Planning Advisory Council.
- Supervised one Assistant Planner.
- Assisted the public with zoning, planning and general questions via the public counter, telephone and e-mail.

STANISLAUS COUNTY PLANNING DEPARTMENT – December, 1996 – July1999
Current Planning, Modesto, California
Associate Planner

- Researched, analyzed and wrote staff reports for land use development proposals.
- Prepared Initial Studies and associated documents per the California Environmental Quality Act.
- Presented staff reports and recommendations for the land use development proposals to the Stanislaus County Planning Commission.
- Assisted the public with zoning, planning and general questions via the public counter and telephone.

IMPERIAL COUNTY PLANNING AND BUILDING DEPARTMENT - October, 1990 – December, 1996
Current Planning, El Centro, California
Planner III

- Researched, analyzed and wrote staff reports for land use development proposals.
- Prepared Initial Studies and associated documents per the California Environmental Quality Act.
- Assisted the public with zoning, planning and general questions via the public counter and telephone.

EDUCATION

University of California, Riverside
Bachelor of Arts in Administrative Studies – 1989

DECLARATION OF

Dr.Obed Odoemelam

I, **Obed Odoemelam** declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting, Transmission, and Environmental Protection Division as a Staff Toxicologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Transmission Line safety and Nuisance** for Genesis Solar Energy Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, California

RESUME

DR. OBED ODOEMELAM

EDUCATION:

1979-1981 University of California, Davis, California. Ph.D., Ecotoxicology

1976-1978 University of Wisconsin, Eau Claire, Wisconsin. M.S., Biology.

1972-1976 University of Wisconsin, Eau Claire, Wisconsin. B.S., Biology

EXPERIENCE:

1989
The Present: California Energy Commission. Staff Toxicologist.

Responsible for the technical oversight of staffs from all Divisions in the Commission as well as outside consultants or University researchers who manage or conduct multi-disciplinary research in support of Commission programs. Research is in the following program areas: Energy conservation-related indoor pollution, power plant-related outdoor pollution, power plant-related waste management, alternative fuels-related health effects, waste water treatment, and the health effects of electromagnetic fields. Serve as scientific adviser to Commissioners and Commission staff on issues related to energy conservation. Serve on statewide advisory panels on issues related to multiple chemical sensitivity, ventilation standards, electromagnetic field regulation, health risk assessment, and outdoor pollution control technology. Testify as an expert witness at Commission hearings and before the California legislature on health issues related to energy development and conservation. Review research proposals and findings for policy implications, interact with federal and state agencies and industry on the establishment of exposure limits for environmental pollutants, and prepare reports for publication.

1985-1989 California Energy Commission.

Responsible for assessing the potential impacts of criteria and noncriteria pollutants and hazardous wastes associated with the construction, operation and decommissioning of specific power plant projects. Testified before the Commission in the power plant certification process, and interacted with federal and state agencies on the establishment of environmental limits for air and water pollutants.

1983-1985 California Department of Food and Agriculture.

Environmental Health Specialist.

Evaluated pesticide registration data regarding the health and environmental effects of agricultural chemicals. Prepared reports for public information in connection with the eradication of specific agricultural pests in California.

DECLARATION OF
James Earl Jewell

I, **James Earl Jewell** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission in the Siting, Transmission and Environmental Protection Division as a **Illuminating Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I assisted in the preparation of the final staff testimony for the Genesis Solar Energy Project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 6, 2010 Signed: _____

At: Sacramento, California

JAMES EARL JEWELL, LC, ATF, IES, CIES (Hon), SAH

EDUCATION:

BA, College of the Pacific
MFA, School of Drama, Yale University

EMPLOYMENT:

1957-67, Engineering Division, Holzmueller Corporation
1967-69, Theatre Consulting Service, Bolt, Beranek & Newman
1969-87, Lighting Services Administrator, Pacific Gas & Electric Company
1987- present, Consultant in Lighting
Since 1993 in association with Alan Lindsley, AIA, IES

PROFESSIONAL ACTIVITIES:

Illuminating Engineering Society
President – 1984-85
Vice President – 1983-84
Director – 1979-86
Office Lighting Committee – 1976 - present, Chairman, 1978-80
Roadway Lighting Committee – 1974 – present, Chairman, 1990-92
Regional Energy Committee Chairman – 1974-76, 1978-84
Energy Advisory Committee – 1973-75
Technical Missions – China – 1984, 1987, 1988

European Lighting Congress: Strasbourg, 1969; Florence, 1977; Granada, 1981; Lausanne, 1985; Budapest, 1989; Edinburgh, 1993; Berlin, 2001

Pacific Basin Lighting Congress: Chairman, Shanghai, 1989; Bangkok, 1993; Nagoya, 1997; Organizing Committee, Delhi, 2002; Cairns, 2005; Bangkok, 2009

Edison Electric Institute: Street Lighting Committee – 1971-87, Chairman 1979-81

International Commission on Illumination:
Board of Administration – 1983-87, 1987-91
Division Four (Lighting for Transport)
Technical Committee 4.34 -- 1980-95
Technical Committee 4.25 -- 1992-99

Professional Light Designers Convention: London, 2007; Berlin, 2009

EXPERT WITNESS – Admitted as an expert witness in the Superior Courts of Amador, Contra Costa, and San Francisco Counties.

AWARDS AND HONOURS:

IES Regional Technical Award – 1985
IES Distinguished Service Award – 1986
College of Fellows of the American Theatre --1988
Honourary Member, China IES – 1989
CIE Distinguished Service Award – 1991
IES Louis B. Marks Award – 1993

CERTIFICATION:

LC – Granted in 1990 by the National Council on the Qualification of Lighting Professionals

RELEVENT WORK EXPERIENCE:

With PG&E appeared before CEC Committee and Staff on lighting issues with respect to the siting and licensing of Geysers steam power plants.

On behalf of PG&E and the IES appeared before the Simonson Committee to consult on the development of the lighting portions of Title 24.

On behalf of PG&E and the IES appeared before the CEC on numerous occasions to support the development of fluorescent lamp promotional programs and to assist in developing rigorous lighting ballast standards for California and on other lighting energy management issues.

While at PG&E supported and oversaw funding for projects on daylight following and electronic ballasts. Projects supported by both the DOE and CEC.

In practice as a lighting consultant worked with private clients and jurisdictions on matters concerned with light trespass and "intrusive" lighting.

JEJewell
19 February 2010

DECLARATION OF
William D. Kanemoto

I, William Kanemoto, declare as follows:

1. I am presently under contract with Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-05-002, I am serving as a Visual Resource Specialist to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the final staff testimony on Visual Resources for the Genesis Power Plant Licensing Case based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared visual simulation of project vapor plumes is valid and accurate with respect to the data provided to me.

5. I am personally familiar with the facts and conclusions applicable to the vapor plume simulations and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 10, 2010 Signed

At: Oakland, California

William Kanemoto

Visual Resource/Aesthetics Analyst

Academic Background:

M. Landscape Architecture, University of Michigan, Ann Arbor, 1982
B.A. Liberal Arts (Honors), University of California, Santa Cruz, 1973

Professional Experience:

Principal
William Kanemoto & Associates, Oakland, California, 1993 - Present

William Kanemoto is Principal of William Kanemoto & Associates, an environmental consulting practice specializing in visual analysis and computer visualization in the context of environmental review. In this capacity he has served as principal investigator for visual analysis and simulation on a wide range of major infrastructure and development projects, including the High Desert Power Project AFC, Port of Oakland Expansion EIS, Route 4 East/Pittsburg BART EIS, FMC Substation and Transmission Line PEA, and numerous other infrastructure and transportation projects. Mr. Kanemoto received recognition from the California Association of Environmental Professionals for visual analysis, computer simulation, animation, and video production for the Stanford Sand Hill Road Projects EIR, prepared by EIP Associates and judged 'Best State-Wide EIR of 1997'.

Associate Director
Environmental Simulation Laboratory,
Institute of Urban and Regional Development,
Center for Environmental Design Research
University of California, Berkeley, 1994 - 2000

Instructed graduate students in the College of Environmental Design, U.C. Berkeley, served as consultant on various major planning projects in the San Francisco Bay Area, and conducted design collaborations with counterparts at Keio University and ARK CyberUniversity in Tokyo, Japan via the Internet.

Principal Investigator/Project Manager
Dames & Moore, San Francisco/Oakland, California, 1988-1992

Served as principal investigator of numerous visual analyses of major infrastructure projects throughout the U.S., in Europe, and in Asia. Gained extensive familiarity with the application of a wide range of professionally accepted visual assessment techniques in the context of CEQA, NEPA, and related regulatory requirements of the CPUC, CEC, FERC, DOT, U.S. Forest Service, BLM, and other agencies.

Project Manager
LSA Associates, Pt. Richmond, California, 1987-1988

Project manager and planner on environmental impact reports for various residential and commercial development projects in northern California.

Environmental Planner
Holton Associates, Berkeley, California, 1984-1987

Preparation of various resource and regulatory studies including EIRs, FERC Exhibit E, Section 404 alternative analyses, riparian restoration studies, and cumulative impact methodology studies for EPRI and Sierra County, CA.

DECLARATION OF
James Thurber

I**,** James Thurber**,** declare as follows:

1. I am presently under contract with Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division. I am serving as a Geologist to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared staff testimony on Waste Management for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from documents and sources deemed to be reliable, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions applicable to the vapor plume simulations and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 4, 2010 Signed: James Thurber

At: Lake Forest, California

STATEMENT OF QUALIFICATIONS

JAMES E. THURBER
Professional Hydrogeologist

Mr. Thurber is a highly qualified hydrogeologist, experienced in the development of municipal water supply resources. His expertise encompasses the ability to assess the hydrogeology of groundwater basins; define aquifer characteristics; select water well sites; design water wells; and manage construction of wells. Mr. Thurber is actively involved in water resource evaluations related to groundwater recharge and recovery and use of groundwater with impaired water quality. He is experienced with groundwater modeling and assessment of water quality issues. He is well versed in the interpretation of stratigraphic and geophysical logs for final selection of screened intervals and gravel pack during well construction to optimize sand-free groundwater production. Mr. Thurber is experienced in monitoring construction of the well to confirm accurate placement of the well screen, gravel pack and seals. He is experienced in the analysis of pumping test results to define production levels and develop recommendations for operation and maintenance as well as water quality monitoring. He is also experienced in water quality sampling by aquifer isolation methods. Mr. Thurber is experienced in hazardous waste investigations and has performed hazardous material and groundwater contamination assessments.

REGISTRATION

Registered Geologist, California
Certified Engineering Geologist, California
Certified Hydrogeologist, California

EDUCATION

Colorado State University, M.S., Geology, 1982
California State University, Northridge, B.S., Geology, 1978
California State University, Northridge, B.A., Geography, 1976

MEMBERSHIPS

National Ground Water Association
American Water Works Association

EXPERIENCE

GEOTECHNICAL CONSULTANTS, INC. Joined the firm in 1985. Mr. Thurber is assisting Orange County Water District with the design and construction management of new injection wells on the Talbert Seawater Intrusion Barrier. Mr. Thurber was the project hydrogeologist for the San Pasqual Groundwater Basin study performed for the City of San Diego, responsible for selection of existing agricultural wells for pump testing, construction of observation wells, pump testing, data collection and analysis to determine aquifer parameters. Mr. Thurber developed the well field design for the San Pasqual Water Resources Management Plan, a groundwater replenishment project that uses a series of injection and extraction wells to store reclaimed water and recover it for potable use. He has developed groundwater flow models for the assessment of longterm pumping, sustained yield, and water quality impacts. Mr. Thurber has performed geologic logging, well design, construction observation, development and pump testing of over 40 high-capacity supply wells. He has developed and implemented plans for rehabilitation of biologic induced well fouling. Mr. Thurber was the project manager for the Irvine Desalter Project including well design and aquifer testing of four new production wells. Mr. Thurber was project manager for drilling 18 test holes and design, construction and pump testing of 9 extraction wells and 8 monitoring wells for the Northeast Disposal Area, George Air Force Base. He has conducted aquifer characterizations at major landfills in southern California. He has participated in a number of hydrogeologic assessments to evaluate contamination from leaking underground tanks or other sources.

Municipal Water Wells

Well No. 125, City of Westminster, California
Sebastapol Road and Occidental Road Emergency Supply Wells, Sonoma County Water Agency, Santa Rosa, California
Well Nos.19, 20, 21, 22, 23, 24 and 25, City of Orange, California
Well No.1B, No. 8, No. 9 and No. 11, Mesa Consolidated Water District, Costa Mesa, California
Water Well Rehabilitation, Mesa Consolidated Water District, Well Nos. 4, 5, 7 and 8, Costa Mesa, California
Vandenberg Well, City of Tustin, California
Well IDP-1, IDP-2, IDP-3 and IDP-4, Irvine Desalter Project, Orange County Water District, California
Ball and Boisseranc Wells, Buena Park, California
Wells 2201 and 2363, USMC Camp Pendleton Air Base, Oceanside, California

Valley Well No.2, San Diego Wild Animal Park, San Pasqual Valley, Escondido, California
Camanche North Shore Water Well, East Bay MUD, Amador County, California

Groundwater Injection Wells

Talbert Seawater Intrusion Barrier, I24, I25 and I26, Orange County Water District, Fountain Valley, California

Groundwater Monitoring, Site Characterization Studies

Newport Mesa Multi-Aquifer Monitoring Wells M39 and M40, Orange County Water District, Costa Mesa, California
Maderas Golf Course, Poway, California
North Shore Camp, Lake Camanche, Amador County, California
San Pasqual Valley, San Diego, California
Mesa Consolidated Water District/Orange County Water District, Deep Multi-Port Monitoring Well, Costa Mesa, California
Calabasas Landfill, Calabasas, California
Puente Hills Landfill, Whittier, California
Los Alamitos AFRC Landfill, Los Alamitos, California
Norwalk Dump, Norwalk, California
Stinnes-Western Chemical Corporation, Vernon, California
Cooper Drum Company, South El Monte, California
George Air Force Base, Adelanto, California
Castrol, Inc., Los Angeles, California
Palomar Airport Landfill, Carlsbad, California

Leaking Underground Fuel Tanks

Orange Fire Station, Orange, California
California Industrial Products, Santa Fe Springs, California
Rexnord-Tridair Industries, Torrance, California
W. A. Woods Industries, South Gate, California
Property Management Systems, Santa Ana, California
Burch Ford, La Habra, California
Kaama Marine Engineering, Costa Mesa, California

Groundwater Related Technical Studies for Environmental Impact Reports

North County Landfill Siting Study, San Diego County, California
Imperial Redevelopment Project, San Diego, California
Cajon Pipeline, San Bernardino and Los Angeles Counties, California
Pacific Pipeline, Santa Barbara, Ventura and Los Angeles Counties, California
Santa Fe Pacific Partners Pipeline, Carson to Norwalk, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Facility Design** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Efficiency** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I**, SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Reliability** for the **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: Sacramento, California

Shahab Khoshmashrab
Mechanical Engineer

Experience Summary

Nine years experience in the Mechanical, Civil, Structural, and Manufacturing Engineering fields involving engineering and manufacturing of various mechanical components and building structures. This experience includes QA/QC, construction/licensing of electric generating power plants, analysis of noise pollution, and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Sacramento-- Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California

Professional Experience

2001-2004--Mechanical Engineer, Systems Assessment and Facilities Siting– California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise and vibration, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

1998-2001--Structural Engineer – Rankin & Rankin

Engineered concrete foundations, structural steel and sheet metal of various building structures including energy related structures such as fuel islands. Performed energy analysis/calculations of such structures and produced structural engineering detail drawings.

1995-1998--Manufacturing Engineer – Carpenter Advanced Technologies

Managed manufacturing projects of various mechanical components used in high tech medical and engineering equipment. Directed fabrication and inspection of first articles. Wrote and implemented QA/QC procedures and occupational safety procedures. Conducted developmental research of the most advanced manufacturing machines and processes including writing of formal reports. Developed project cost analysis. Developed/improved manufacturing processes.

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

I, **Dal Hunter, Ph.D., C.E.G.,** declare as follows:

1. I am presently employed as a subcontractor to Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division, as an engineering geologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **GEOLOGY AND PALEONTOLOGY** for the proposed **Genesis Solar Energy Project** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and changed Condition of Certification is valid and accurate and comports with my prior written testimony in the Final Staff Assessment.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: March 24, 2010 Signed: _____

At: Black Eagle Consulting, Inc.

Reno, Nevada

REGISTERED GEOLOGIST
ROBERT DALTON HUNTER
No. 1411
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

exp 3.31.11

Robert D. Hunter, Ph.D., C.E.G.
Engineering Geologist
Vice President

Education

- Ph.D. – Geology – 1989 – University of Nevada, Reno
- M.S. – Geology – 1976 – University of California - Riverside
- B.S. – Earth Science – 1972 – California State University, Fullerton

Registrations

- Professional Geological Engineer – Nevada
- Registered Geologist – California
- Certified Engineering Geologist – California

Experience

1997 to Present: Black Eagle Consulting, Inc.; Vice President. Dr. Hunter is in charge of all phases of geochemical, geological, and geotechnical projects and is responsible for conducting, coordinating, and supervising geotechnical investigations for public and private sector clients. He is very familiar with design specifications and state and federal requirements.

Dr. Hunter has also provided geological, geotechnical, and paleontological review and written and oral testimony for California Energy Commission (CEC) power plant projects including:

- El Segundo Power Redevelopment Project (Coastal, including testimony and compliance monitoring)
- Magnolia Power Project (including compliance monitoring
- Ocotillo Energy Project (Wind Turbines)
- Vernon-Malburg Generating Station
- Inland Empire Energy Center (including testimony and compliance monitoring)
- Palomar Energy Project
- Henrietta Peaker Project
- East Altamont Energy Center
- Avenal Energy Center
- Teayawa Energy Center monitoring
- Walnut Energy Center (including compliance monitoring
- Riverside Energy Resource Center
- Salton Sea Unit 6 (Geothermal Turbines)
- National Modoc Power Plant
- Pastoria Energy Center
- Sun Valley Energy Project
- El Centro Unit 3 Repower Project
- AES Highgrove Project
- South Bay Replacement Project
- Vernon Power Plant

- Humboldt Bay Repowering Project
- Victorville Power Project
- Carlsbad Energy Center
- San Gabriel Generating Station
- Orange Grove
- Chula Vista Energy Upgrade
- Carrizo (Solar)
- Kings River
- Canyon Power Plant
- Otay Mesa Generating Project (compliance monitoring)
- Montainview Power Plant Project (compliance monitoring)
- Consumes Power Plant (compliance monitoring)
- Sunrise Power Project (compliance monitoring)
- Niland Power Project (compliance monitoring)
- Panoche Power Plant (compliance monitoring)

Attended Expert Witness Training Sponsored by CEC.

1978 to 1997: SEA, Incorporated; Geotechnical Manager, Engineering Geologist. Dr. Hunter was in charge of all phases of geotechnical projects for SEA, including project coordination and supervision, field exploration, geotechnical analysis, slope stability analysis, soil mechanics, engineering geochemistry, mineral and aggregate evaluations, and report preparation. Numerous investigations were undertaken on military, commercial, industrial, airport, residential, and roadway projects. He worked on many geothermal power plants, providing expertise in foundations design, slope stability, seismic assessment, geothermal hazard evaluation, expansive clay, and settlement problems. Project types included high-rise structures, airports, warehouses, shopping centers, apartments, subdivisions, storage tanks, roadways, mineral and aggregate evaluations, slope stability analyses, and fault studies.

1977 to 1978: Fugro (Ertec) Incorporated Consulting Engineers and Geologists; Staff Engineering Geologist; Long Beach, California.

Affiliations

- Association of Engineering Geologists

Publications

- Hunter, 1988, *Lime Induced Heave in Sulfate Bearing Clay Soils*, Journal of Geotechnical Engineering, ASCE, Vol. 14, No. 2, pp. 150-167.

- Hunter, 1989, *Applications of Stable Isotope Geochemistry in Engineering Geology*: Proceedings of the 25th Annual Symposium on Engineering Geology and Geotechnical Engineering.

- Hunter, 1993, *Evaluation of Potential Settlement Problems Related to Salt Dissolution in Foundation Soils*: Proceedings of the 29th Annual Symposium on Engineering Geology and Geotechnical Engineering.

Robert D. Hunter, Ph.D., C.E.G.
Engineering Geologist
Vice President

Education

- Ph.D. – Geology – 1989 – University of Nevada, Reno
- M.S. – Geology – 1976 – University of California - Riverside
- B.S. – Earth Science – 1972 – California State University, Fullerton

Registrations

- Registered Geologist – California
- Certified Engineering Geologist – California
- Professional Geological Engineer – Nevada

Experience

1997 to Present: Black Eagle Consulting, Inc.; Vice President. Dr. Hunter is in charge of all phases of geological, geotechnical, and geochemical projects and is responsible for conducting, coordinating, and supervising geotechnical investigations for public and private sector clients. He has worked on numerous industrial and commercial projects over the last 30 years. Dr. Hunter is very familiar with state and federal design specifications as well as CEQA and NEQA requirements related to geology and paleontology.

Dr. Hunter has also provided geological, geotechnical, and paleontological review and written and oral testimony for California Energy Commission (CEC) power plant projects including:

- El Segundo Power Redevelopment Project (including compliance monitoring)
- Magnolia Power Project (including compliance monitoring)
- Ocotillo Energy Project (Wind Turbines)
- Vernon-Malburg Generating Station
- Inland Empire Energy Center (including compliance monitoring)
- Palomar Energy Project
- Henrietta Peaker Project
- BP Carson Peaker Project
- East Altamont Energy Center
- Avenal Energy Center
- Teayawa Energy Center monitoring
- Walnut Energy Center (including compliance monitoring)
- Riverside Energy Resource Center
- Salton Sea Unit 6 (Geothermal Turbines)
- National Modoc Power Plant
- Pastoria Energy Center
- Walnut Creek Energy Park
- Sun Valley Energy Project
- El Centro Unit 3 Repower Project

- AES Highgrove Project
- South Bay Replacement Project
- Vernon Power Plant
- Bullard Energy Center Project
- Humboldt Bay Repowering Project (including compliance monitoring)
- Victorville Power Project
- Carlsbad Energy Center
- San Gabriel Generating Station
- Orange Grove
- Chula Vista Energy Upgrade
- Carrizo (Solar)
- KRCD Community Power
- Carrizo Power Plant (including compliance monitoring)
- Sentinel Peaker Project
- Canyon Power Plant
- Riverside Acorn SPPE Project
- Beacon Solar Generating Station
- Stirling 2 Solar Project
- Stirling 1 Solar Project
- City of Palmdale
- eSolar1 Solar Generating Project
- Otay Mesa Generating Project (compliance monitoring)
- Montainview Power Plant Project (compliance monitoring)
- Consumes Power Plant (compliance monitoring)
- Sunrise Power Project (compliance monitoring)
- Niland Power Project (compliance monitoring)
- Panoche Power Plant (compliance monitoring)
- Colusa Generating Station (compliance monitoring)
- Starwood Power Plant (compliance monitoring)
- Los Mendanos Power Plant (compliance monitoring)
- Blythe Combined Cycle Plant (compliance monitoring)
- Roseville Energy Plant (compliance monitoring)

Attended Expert Witness Training Sponsored by CEC.

1978 to 1997: SEA, Incorporated; Geotechnical Manager, Engineering Geologist. Dr. Hunter was in charge of all phases of geotechnical projects for SEA, including project coordination and supervision, field exploration, geotechnical analysis, slope stability analysis, soil mechanics, engineering geochemistry, mineral and aggregate evaluations, and report preparation. Numerous investigations were undertaken on military, commercial, industrial, airport, residential, and roadway projects. He worked on many geothermal power plants, providing expertise in foundations design, slope stability, seismic assessment, geothermal hazard evaluation, expansive clay, and settlement problems. Project types included high-rise structures, airports, warehouses, shopping centers, apartments, subdivisions, storage tanks, roadways, mineral and aggregate evaluations, slope stability analyses, and fault studies.

1977 to 1978: Fugro (Ertec) Incorporated Consulting Engineers and Geologists; Staff Engineering Geologist; Long Beach, California.

Affiliations

- Association of Engineering Geologists

Publications

- Hunter, 1988, *Lime Induced Heave in Sulfate Bearing Clay Soils*, Journal of Geotechnical Engineering, ASCE, Vol. 14, No. 2, pp. 150-167.

- Hunter, 1989, *Applications of Stable Isotope Geochemistry in Engineering Geology*: Proceedings of the 25th Annual Symposium on Engineering Geology and Geotechnical Engineering.

- Hunter, 1993, *Evaluation of Potential Settlement Problems Related to Salt Dissolution in Foundation Soils*: Proceedings of the 29th Annual Symposium on Engineering Geology and Geotechnical Engineering.

DECLARATION OF
Mark Hesters

I, **Mark Hesters**, declare as follows:

1. I am presently employed by The California Energy Commission in the **Siting, Transmission and Environmental Protection Division** as a Senior Electrical Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Transmission System Engineering**, for the **Genesis Solar Energy Project**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated:_____ Signed:_____

At: Sacramento, CA_____

Mark Hesters
Associate Electrical Engineer

Mark Hesters has fourteen years of experience in electric power regulation. He worked in the Engineering Office of the California Energy Commission's Energy Facilities Siting & Environmental Protection Division since 1998 providing analysis of California transmission systems and testimony on transmission systems in several Commission power plant certification processes. Prior to that Mark worked in the CEC's Electricity Analysis Office providing lead analysis on Southern California Edison resource issues and modeling support for all areas of California. He holds a B.S. degree from the University of California at Davis in Environmental Policy Analysis and Planning.

DECLARATION OF

Sudath Edirisuriya

I, Sudath Edirisuriya declare as follows:

I am presently employed by the California Energy Commission in the Engineering Office of the Systems Assessments and Facilities Siting Division as an Electrical Engineer.

A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

I helped prepare the staff testimony on Transmission System Engineering for the Genesis Solar Energy project based on my independent analysis and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Date: June 10, 2010. Signed: Sudath Edirisuriya

At: Sacramento, California

Sudath A. Edirisuriya
1916 Ackleton Way
Roseville CA 95661 **Phone 916-654-4851**

EDUCATION:

Bachelor of Science in Electrical Engineering at California State University Fullerton

ATTAINMENTS:

Member of the Professional Engineers in California Government
Vice President Electrical Engineering Society-California State University Fullerton.

EXPERIENCE:

November-2001 to Present: - Associate Electrical Engineer, System Assessment and Facilities Siting Division, California Energy Commission.
Working in the Transmission System Engineering unit on licensing generation projects. Work involves evaluating generation interconnection studies (SIS and FS), their reliability and environmental impacts on transmission system, preparing staff assessment reports, presenting testimony. Perform reliability studies and coordinating data and technical activities with utilities, California ISO and other agencies. Conduct and perform planning studies and contingency analysis including power flow, short-circuit, transient, and post-transient analysis to maintain reliable operation of the power system. Understanding of regulatory and reliability guidelines, WECC and NERC planning and operation criteria, CPUC and FERC requirements. Review technical analyses for WECC/CA ISO/PTO transmission systems and proposed system additions; and provide support for regulatory filings.

June-1998 to November-2001: - Project Electrical Engineer, Design Electrical Engineering Section, Department of Transportation, California.
Electrical Engineering knowledge and skills in the design, construction and maintenance of California state work projects involving all the public work areas; contract administration, construction management, plan checking, field engineering and provide liaison with consultants, developers, and contractors. Plan review in facility constructions, highway lighting, sign lighting, rest area lighting, preparation of project reports, cooperative agreements, review plans for compliance of construction and design guide lines for national electrical code, standards and ordinance. Review process included breaker relay coordination, detail wiring diagrams, layout details, service coordination, load, conductor sizes, derated ampacity, voltage drop calculations, harmonic and flicker determination.

June-1993 to May-1998:- Substation Electrical Engineer, City of Anaheim, California.
Performed protective relay system application, design and setting determination in Transmission & Distribution Substation. Understanding of principles of selective coordination system protection and controls for Electric Utility Equipment. Understanding of Power theory and Analysis of symmetrical components. Ability to review engineering plans, specifications, estimates and computation for Electrical

Utility Projects. Practices of Electrical Engineering design, to include application of Electro-mechanical and solid state relays in Electrical Power Systems. Software skills in RNPDC (Fuse Coordination Program), Capacitor Bank allocation program, and GE Load Flow Program. Design projects using CAD, Excel spread sheets including cost estimates, wiring diagrams, material specifications and field coordination.

Performed underground service design 12kV and 4kV duct banks; pole riser; getaway upgrade; voltage drop calculation, ampacity calculation and wiring diagrams. Design and maintenance of substations in City Electrical Utility System. Upgrade Station Light and power transformers; upgrade capacitor banks; replacement of 12kV-4kV power circuits; Breakers at Metal Clad Switchgear. Design one-line diagrams; three line diagrams; grounding circuits; schematics; coordination of relay settings; conduit and material list preparation. Calculation of derated ampacity; inrush current, short circuit current.

DECLARATION OF
Mary Dyas

I, **Mary Dyas**, declare as follows:

1. I am presently employed by The California Energy Commission in the **Compliance Unit** as a **Compliance Project Manager**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **General Conditions**, for the **Genesis Solar Energy Project Revised Staff Assessment**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: _____ Signed: _____

At: _____

MARY DYAS

CALIFORNIA ENERGY COMMISSION – COMPLIANCE PROJECT MANAGER

PROFESSIONAL EXPERIENCE

Planner II/III – Energy Facilities Compliance Project Manager *05/01/2008 to Present*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, California

Compliance Project Manager—Provide oversight of energy facility construction and operation activities to ensure compliance with conditions of certification. Function as team leader for all compliance monitoring activities, processing of post-certification amendments, complaints, and facility closures.

Currently acting as working team leader on projects filed with the Energy Commission including renewable energy projects (SES Solar One and Solar Two), transmission line projects (Blythe Transmission Line), and natural gas-fired energy projects (Russell City Energy Center) in the licensing, construction and operational phases of each project.

Planner I/II – Energy Facilities Siting Project Manager *01/18/2006 to 04/30/2008*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, California

Siting Project Manager – Provide day-to-day management of complex and controversial energy facility siting projects and renewable solar projects, including the Carrizo Energy Solar Farm Project, Bullard Energy Center, El Centro Unit 3 Repower Project and Chevron Replacement Project. Planning, organizing and directing the work of an interdisciplinary environmental and engineering staff team engaged in the review of complex or controversial energy facility siting Applications for Certification.

Energy Analyst / Associate Energy Specialist – LNG Research *09/27/2002 to 01/17/2006*
Natural Gas Office / Transportation Division, California Energy Commission, Sacramento, California

Coordinating and assisting with the facilitation of monthly Interagency LNG Working Group meetings involving cooperative federal, state, and local agencies; assisting with report writing conducting LNG facility assessments; Organizing/facilitating public workshops and preparing status reports on LNG facility development for use by Commissioners and Governor's Office, as well as reviewing and analyzing LNG-related legislative bills in California; Creating and maintaining the Commission LNG webpage, researching and preparing numerous LNG fact sheets for public education, and gathering information on new technology, tracking new LNG projects, and LNG market information.

Office Technician / Energy Analyst - Assistant Siting Project Manager *06/27/2000 to 09/27/2002*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, CA

Assisting energy facility project managers with organization of and conducting workshops and public meetings between staff and power plant developers, other governmental agencies, private organizations, and the public. Also assisting with the reviewing, evaluating and editing of project correspondence, reports, and testimony as well as assisting project secretaries, and Office Managers as needed. Also performed all the same duties in relation to the Emergency Power Plant Permitting 21-day, 4-month, 6-month and 12-month projects.

Office Technician / Energy Analyst - Assistant Siting Project Manager *06/27/2000 to 09/27/2002*
Siting Unit / Siting and Compliance Office, California Energy Commission, Sacramento, CA

Managing the Siting Peak Workload Contract, including the preparation of hundreds of work authorizations, invoices, and general coordination of work between technical staff and contractor and preparing associated budget information for office managers and executive office.

EDUCATION

Bachelor of Science degree in Biological Sciences *California State University, Sacramento ~ 1995*

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE
GENESIS SOLAR ENERGY PROJECT

Docket No. 09-AFC-8

PROOF OF SERVICE
(Revised 6/7/10)

APPLICANT
Ryan O'Keefe, Vice President
Genesis Solar LLC
700 Universe Boulevard
Juno Beach, Florida 33408
E-mail service preferred
Ryan.okeefe@nexteraenergy.com

Scott Busa/Project Director
Meg Russel/Project Manager
Duane McCloud/Lead Engineer
NextEra Energy
700 Universe Boulvard
Juno Beach, FL 33408
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DECLARATION OF SERVICE

I, Maria Santourdjian declare that on June 11, 2010, I served and filed copies of the attached Revised Staff Assessment for Genesis Solar Energy Project (09-AFC-8). The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [http://ww.energy.ca.gov/sitingcases/genesis_solar].

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

__x__ sent electronically to all email addresses on the Proof of Service list;

__x__ by personal delivery;

__x__ by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

__x__ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

OR

____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-8
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Originally Signed by
Maria Santourdjian

*indicates change