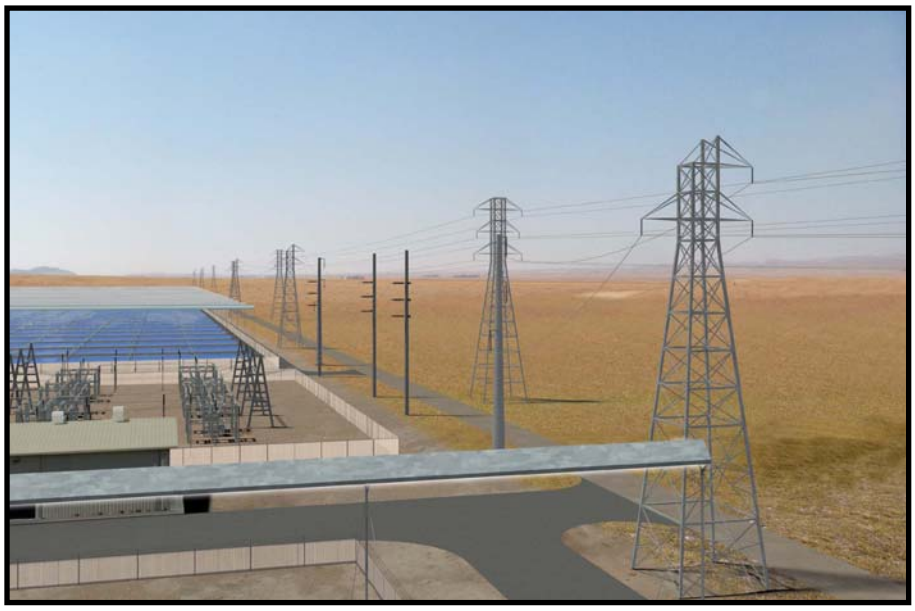
Preliminary Staff Assessment

CARRIZO ENERGY SOLAR FARM

Application For Certification (07-AFC-8)
San Luis Obispo County



CALIFORNIA ENERGY COMMISSION

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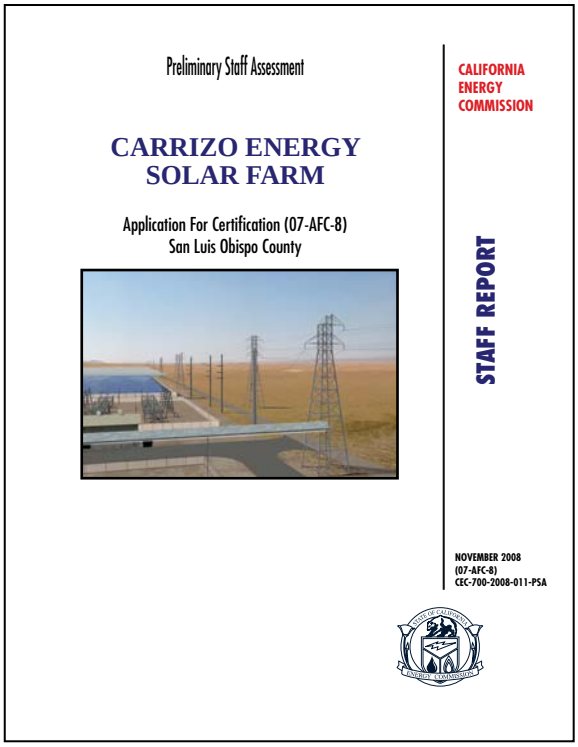

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CARRIZO ENERGY SOLAR FARM
(07-AFC-8)
PRELIMINARY STAFF ASSESSMENT

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EXECUTIVE SUMMARY

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INTRODUCTION

This Preliminary Staff Assessment (PSA) contains the California Energy Commission staff's independent evaluation of the Carrizo Energy Solar Farm (CESF) Application for Certification (07-AFC-8). The PSA examines engineering, environmental, public health and safety aspects of the CESF project, based on the information provided by the applicant (Carrizo Energy, LLC) and other sources available at the time the PSA was prepared. The PSA contains analyses similar to those normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA). When issuing a license, the Energy Commission is the lead state agency under CEQA, and its process is functionally equivalent to the preparation of an EIR. After a 30-day public comment period on the PSA, staff will issue its testimony in the form of the Final Staff Assessment (FSA).

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 proposes conditions of certification for construction, operation and eventual closure of the project, if approved by the Energy Commission.

This PSA 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. Rather, the FSA will serve as staff's formal testimony in evidentiary hearings to be held by the Committee of two Commissioners who are hearing this case. After evidentiary hearings, the Committee will consider the recommendations presented by staff, the applicant, all parties, government agencies, and the public prior to proposing its decision. The full Energy Commission will make the final decision, including findings, after the Committee's publication of its proposed decision.

PROJECT LOCATION AND DESCRIPTION

The proposed 640-acre project site is located immediately adjacent to California State Route 58 (SR-58)/Carrisa Highway, approximately 3 miles west of Simmler in eastern San Luis Obispo County. The CESF site currently consists of disturbed dry farmed land and abandoned farm structures, and is in an area zoned for agricultural uses as specified in the San Luis Obispo County General Land Use Plan. Electrical generation is listed in the San Luis Obispo County Land Use Ordinance as an allowed use within the agricultural zone. The land adjoining the proposed project is primarily open, undeveloped land. The 380-acre construction laydown area is located south and adjacent to the proposed project site, and is divided from the project site by SR-58. Main access to the CESF and the general vicinity will be provided via SR-58, immediately south and adjacent to the site. Project construction is proposed to begin during the first quarter of

2009 and take 35 months to complete. The applicant expects that the initial portion of the facility could be online on or before May 2010, and that full commercial operation is expected to begin in the first quarter of 2012. Typical operating hours for the project would be an average of approximately 13 hours per day equating to an annual average of 4,765 hours per year. **Project Description Figures 1 and 2** shows the regional and local settings for the proposed project respectively.

The CESF would consist of approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines. Each line contains 10 rows of reflectors divided into 4 segments. In addition, the project would include associated steam drums, steam turbine generators (STGs), air cooled condensers (ACCs), and infrastructure. The proposed project design would incorporate Ausra's proprietary CLFR technology consisting of a series of slightly curved linear solar reflectors that concentrate solar energy on pipes in an elevated receiver structure approximately 17 m (56 feet) tall. The concentrated solar energy boils water within a row of specially coated stainless steel pipes in an insulated cavity to produce saturated steam. The steam produced in the receivers is collected in a series of pipes, routed to eight steam drums located in the solar field, and then to two steam drums and two STGs in the power block. Steam used by the steam turbines is condensed in two ACCs, and the water is returned to the solar field for steam production.

The CESF would include the construction of a new 230 kilo-volt (kV) switchyard located adjacent to the two STGs. The STGs provide the driving force to spin the generator, which converts the mechanical energy into electrical output. The two STGs would be rated at 93 megawatts (MW) gross capacity each and would generate electricity at 13.8 kV. With plant auxiliary loads, the net plant capacity would be 177 MW. To provide transmission level capability, the electricity generated will be stepped up using two 13.8/230 kV generator step-up transformers. A new double-circuit 230 kV overhead transmission line, approximately 850 feet in length, will interconnect the CESF switchyard to Pacific Gas and Electric's (PG&E's) new loop-in switching station that would also be located within the CESF site along the northern project boundary. Another 90-foot long double circuit 230-kV line would tie PG&E's switching station to the existing Morro Bay–Midway #1 230 kV line located immediately outside the northern project boundary and running west to Morro Bay Powerplant and east to Midway Substation. The loop-in switching station serves as the project's point of interconnection and would reroute the Morro Bay–Midway #1 230 kV line through the switching station. **Project Description Figure 3** shows the general arrangement of the proposed power block of the CESF development and **Project Description Figure 4** shows a visual simulation of the proposed project as conceived by the applicant.

The project is expected to consume approximately 21.8 acre-feet of water per year. Water would be required for make-up to the solar thermal and steam turbine system, washing of solar reflectors and collectors, potable water, service water, and fire protection. All water for the proposed project would be obtained from an existing onsite well and used for all process and potable needs. The water is expected to be treated on-site to varying degrees depending on use. The water would be treated using a skid-mounted water treatment system as provided by a contract service. The treatment system would be comprised of equipment for filtering, softening, demineralizing, and sanitizing the raw water. Blowdown and oil/water separator clear discharge would be

routed to the onsite raw water storage tank for reuse. Stormwater would be collected onsite and directed to swales and detention areas for percolation into the ground. The sanitary system would consist of an underground septic tank and leach field.

The CESF cooling system for heat rejected from the steam cycle would utilize ACCs in order to minimize water use at the CESF. The STGs would exhaust to an exhaust trunk, which carries the steam to the ACCs. All auxiliary cooling systems are closed-loop with fin-fan air coolers.

OTHER SOLAR PROJECTS PROPOSED FOR THE CARRIZO PLAINS

In addition to the proposed solar-thermal CESF project being reviewed under the Energy Commission's AFC licensing process, two photovoltaic (PV) projects are proposed for development in the Carrizo Plains that fall under the permitting authority of San Luis Obispo County. These include Optisolar's 550 MW Topaz Solar Farm that would be located immediately north of the CESF on an approximately 6,200-acre site, and SunPower's 250 MW California Valley Solar Ranch that would be located approximately 5 miles east of the CESF project on an approximately 2,200-acre site.

Optisolar proposes to construct their project in two phases, with the first phase to be developed on lands outside of the Williamson Act agricultural preserve program that would produce 210 MW, and the second phase to be developed on lands currently encumbered by Williamson Act contracts that would produce 340 MW. If approved, the initial phase could begin construction in 2010 and begin producing power for a portion of the Phase I development in 2011, progressing to the full 210 MW by 2012. Assuming Williamson Act contract cancellation, Phase II would be constructed over a second 3-year time span beginning sometime after completion of Phase I. SunPower proposes to construct their project over a 3-year time span beginning in 2010, and producing power for a portion of the completed project beginning in 2011.

The status of these two PV projects at the time of this PSA is that Optisolar has filed their Conditional Use Permit application with the county, and SunPower is expected to do so shortly. Staff has received a copy of the Optisolar application, and was able to utilize it for the Cumulative Impacts analysis contained with this PSA. However, the Sun Power application is not yet available, and thus staff will not be able to consider more detailed information about the California Valley Solar Ranch project until SunPower files its application. **Project Description Figure 5** shows the proximity of the three proposed solar projects to each other, and **Project Description Figure 6** shows the CESF and Optisolar projects in proximity to nearby residences and undeveloped residential lots.

PUBLIC AND AGENCY COORDINATION

On November 7, 2007, the Energy Commission staff provided the CESF project description to a comprehensive list of libraries, agencies, organizations and residences/business within 1,000 feet of the proposed project and 500 feet of the linear facilities. The Commission staff's notification letter requested public and agency review, comment, and continued participation in the Energy Commission's certification process.

In addition, the Public Advisor's Office (PAO) of the Energy Commission provided notification by letter and enclosed notice of the January 29, 2008 Informational Hearing and Site Visit to the Carriza Plains Elementary School, residents living within 6 miles of the proposed project and representatives of environmental, Native American, and certain public interest and regulatory organizations with an expressed or anticipated interest in this project. Also, elected and certain appointed officials of San Luis Obispo County were similarly notified of the hearing and site visit. The PAO also contacted the most prominent radio and television stations in the area and requested public service announcements for the January 29th hearing and site visit. The local TV station, broadcasting from the City of San Luis Obispo, agreed to make public service announcements, and the *San Luis Obispo Telegram--Tribune* newspaper agreed to publicize the hearing and site visit on its community calendar of upcoming public events. The Information Hearing and a Site Visit for the CESF project was conducted on January 29, 2008 at the Carrisa Plains Heritage Association Community Center near Simmler and California Valley.

On March 12, 2008, staff conducted a publicly noticed Data Response and Issue Resolution staff workshop at the Carrisa Plains Heritage Association Community Center and discussed the topics of Biological Resources, Cultural Resources, Land Use, Noise, Traffic and Transportation, Soil and Water Resources, Visual Resources and Waste Management. Participating agencies in the workshop included the applicant, San Luis Obispo County, and CalFire/County Fire, and California Department of Fish and Game (CDFG).

On April 12, 2008, and at the request of Supervisor Patterson of San Luis Obispo County, staff conducted a publicly-noticed Saturday Information Workshop at the Carrisa Plains Heritage Association Community Center. The purpose of the workshop was to provide members of the community and governmental agencies another opportunity to obtain project information, and to offer comments on the proposed project.

On July 15, 2008, staff distributed the revised CESF project description as described in the applicant's July 3, 2008 Supplement to the AFC to a comprehensive list of libraries, agencies, organizations and residences/business within 1,000 feet of the proposed project and 500 feet of the linear facilities. The primary modifications to the proposed project consist of orienting the solar collectors in a north-south rather than an east-west configuration, rotating the power block and moving it farther from sensitive receptors, reducing the two air-cooled condensers from 25 cells to 20 cells each, reducing the number of steam drums in the solar field from 20 to 8, and adding an emergency diesel generator to maintain power supply to controls and monitoring instrumentation in the event station power from PG&E's lines is not available. The modifications also included the proposal to construct a temporary 40,000 square foot manufacturing building at the laydown area that would house robotic welding equipment for fabricating the solar collectors.

On August 5, 2008, staff conducted a second publicly noticed Data Response and Issue Resolution staff workshop at the Carrisa Plains Heritage Association Community Center and discussed the topics of Biological Resources, Noise, Traffic and Transportation,

Soil and Water Resources and Visual Resources. Participating agencies in the workshop included San Luis Obispo County, California Highway Patrol, and California Department of Fish and Game.

In addition to these workshops, extensive coordination has also occurred with numerous other local, state and federal agencies that have an interest in the project including the San Luis Obispo County Planning and Building Department and Air Pollution Control District, CalTrans, U.S. Fish and Wildlife Service (USFWS), and the Federal Aviation Administration (FAA). Staff has also considered the comments of intervenors, community groups, and individual members of the public.

LIBRARIES

On November 7, 2007, the Energy Commission sent the CESF AFC to the San Luis Obispo County Library, Santa Margarita Library, Simmler Library, Creston Library, and to libraries in Eureka, Fresno, Los Angeles, Sacramento, San Diego, and San Francisco.

ENVIRONMENTAL JUSTICE

The steps recommended by the U.S. EPA's guidance documents to assure compliance with the Executive Order 12898 regarding environmental justice are: (1) outreach and involvement; (2) a screening-level analysis to determine the existence of a minority or low-income population; and (3) if warranted, a detailed examination of the distribution of impacts on segments of the population. Though the Federal Executive Order and guidance are not binding on the Energy Commission, staff finds these recommendations helpful for implementing this environmental justice analysis. Staff has followed each of the above steps for the following 11 sections in the PSA: Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Socioeconomics, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management. Over the course of the analysis for each of the 11 areas, staff considered potential impacts and mitigation measures, significance, and whether there would be a disproportionate impact on an environmental justice population.

The purpose of staff's environmental justice screening analysis is to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. Staff conducted the screening analysis in accordance with the "Final Guidance for Incorporating Environmental Justice Concerns in USEPA's National Environmental Protection Act Compliance Analysis" (Guidance Document) dated April 1998. People of color populations, as defined by this Guidance Document, are identified where either:

- the minority population of the affected area is greater than fifty percent of the affected area's general population; or
- the minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

While **SOCIOECONOMICS Figure 1** (located in the **Socioeconomics** section of this analysis) shows that there are two census blocks that include minority populations

greater than 50 percent, this figure also indicates that the combined population for all census blocks within a six-mile radius of the CESF site include a total minority population of about 20.7 percent, which is less than the 50 percent threshold. Staff has identified a significant direct and cumulative impact to vehicle traffic traveling State Route 58 during construction, and significant noise impacts to sensitive receptors during CESF construction and operation. Impacts are currently undetermined for Visual Resources. While staff has identified these significant impacts, staff believes that there is a reasonable likelihood that they can be mitigated by the time applicant and staff address these issues for the FSA. Therefore, the construction and operation of the CESF project will be further evaluated for the FSA as to whether it would have a disproportional impact on an environmental justice population. Staff has worked closely with the applicant and the residents of the area to identify local mitigation measures designed to reduce to the greatest extent possible any impact that will occur in the community surrounding the proposed project. Staff's environmental justice outreach has been incorporated into its overall outreach activity facilitated by the Energy Commission's Public Advisor's Office. This activity is summarized in the **Introduction** section to the PSA, and in the subsection to this Executive Summary titled Public and Agency Coordination.

STAFF'S ASSESSMENT

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

- the environmental setting of the proposal;
- impacts on public health and safety, and measures proposed to mitigate these impacts;
- environmental impacts, and measures proposed to mitigate these impacts;
- the engineering design of the proposed facility, and engineering measures proposed to ensure the project can be constructed and operated safely and reliably;
- project closure;
- project alternatives;
- compliance of the project with all applicable laws, ordinances, regulations and standards (LORS) during construction and operation;
- environmental justice for minority and low income populations;
- proposed conditions of certification; and
- recommendation on project approval or denial.

SUMMARY OF PROJECT RELATED IMPACTS

With the exception of the six technical areas identified below, staff believes that as currently proposed, including the applicant's and the staff's proposed mitigation measures and the staff's proposed conditions of certification, the CESF project would

comply with all applicable laws, ordinances, regulations, and standards (LORS). Staff's preliminary conclusions are that significant adverse direct, and cumulative impacts may occur in Traffic and Transportation, and Noise and Vibration. In addition,, four technical areas (Biological Resources, Land Use, Soil and Water Resources, and Visual Resources) are currently undetermined with respect to mitigation of potential impacts and/or for conformance with applicable LORS. For a more detailed review of potential impacts, see staff's technical analyses in the PSA. The status of each technical area is summarized in the table below and the subsequent text.

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

BIOLOGICAL RESOURCES

The CESF would impact 1,020 acres of dry farmed land and disturbed areas that provide habitat for multiple protected wildlife species. The CESF would also block or impair wildlife corridors and cause a loss of habitat that would result in impacts to multiple species. Further, these impacts involve not just the direct impact of the CESF, but cumulative impacts as well when considering the two proposed PV projects in the Carrizo Plain.

Habitat compensation for permanent and temporary impacts remains an unresolved issue arising from two divergent views regarding the quality and importance of the habitat on the project site. Energy Commission biological resources staff, in consultation with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) have concluded that the 1020-acre project area connects blocks of natural land and important populations of the federally-endangered and state-

threatened San Joaquin kit fox (*Vulpes macrotis mutica,* kit fox), and has an important role in the regional recovery strategy for the San Joaquin kit fox.

Conversely, the applicant contends that the project site provides marginal kit fox foraging and pass-through habitat, and is merely a disturbed former agricultural field. These two divergent views about habitat quality and connectivity raise a number of important issues, including: (1) the appropriate compensation and mitigation requirements; (2) the applicant's proposed compensation via an offer of agricultural land to offset habitat loss; (3) pronghorn highway crossing locations, and (4) the potential for impacts to avian species. In addition, the project as currently proposed conflicts with the recovery plan for the San Joaquin kit fox with respect to kit fox corridor needs.

The applicant has proposed mitigation in their 2008 Biological Surveys Report to address habitat loss impacts for the San Joaquin kit fox, California Species of Special Concern American badger (*Taxidea taxus*), and the rare native game species pronghorn (*Antilocapra americana)* by providing 705 acres of agricultural lands or naturalized habitats. However, staff and the CDFG are concerned that the agricultural uses of this habitat could impair the habitat value of that land, resulting in a deficient compensation proposal. Staff, in consultation with CDFG and USFWS, believe that a significantly enhanced and expanded suite of measures will be required to mitigate these impacts. Staff believes that these should include at a minimum the provision of an appropriate amount of habitat compensation land, a suitable endowment to ensure the permanent care and protection of this land, and other mitigation measures yet to be developed. This habitat compensation land could mitigate for direct habitat loss impacts to kit fox, pronghorn, American badger, and burrowing owl (*Athene cunicularia*), and the rare native game species tule elk (*Cervus elaphus*), as well as mitigate for the loss of foraging habitat for raptors and California Species of Special Concern pallid bat (*Antrozous pallidus).* Mitigation for habitat loss remains an unresolved issue, and the applicant will need to work with staff, CDFG, and USFWS to identify the appropriate suite of mitigation measures, which will include the identification and protection of habitat compensation lands.

An additional 13 square miles of solar development is currently planned for the Carrizo Plain in addition to the 1 square mile project proposed by the applicant (see Project Description Figure 5). These proposed projects require a cumulative impact analysis. This cumulative analysis involves the participation of multiple agencies, including the USFWS, CDFG, San Luis Obispo County, and the Energy Commission staff to conduct an analysis and develop appropriate mitigation measures. One component of the cumulative analysis is a modeling effort to analyze wildlife foraging and migration corridors in the project area. This multi-agency corridor modeling process involves coordination with solar project developers in the Carrizo Plain to model existing land uses, habitat types, and known wildlife movements for the focal species of kit fox, pronghorn, and tule elk. This corridor modeling process will help guide the procurement of habitat compensation lands that would mitigate wildlife corridor impacts as well as direct habitat loss. However, it is possible that additional mitigation would be required to fully mitigate impacts to wildlife corridors.

Other details remain to be addressed, such as the need for the applicant to secure an Incidental Take Permit and Streambed Alteration Agreement from CDFG, and a

Biological Opinion from the USFWS. Due to insufficient information and unresolved issues between the applicant, agencies, and staff, Energy Commission staff is unable to conclude whether impacts to biological resources during construction and operation of CESF would be mitigated to less than significant levels. Similarly, staff cannot determine at this time whether the project would conform with all applicable Laws, Ordinances, Regulations and Standards (LORS).

LAND USE

With the exception of chapter 22.32.030 of the San Luis Obispo County Land Use Ordinance, the proposed CESF, with implementation of the recommended conditions of certification, would be consistent with the applicable laws, ordinances, regulations, and standards (LORS) pertaining to local land use planning and would not create a significant impact under the California Environmental Quality Act (CEQA) guidelines. The proposed project would result in the permanent conversion of 640 acres of agricultural land to a non-agricultural use (i.e., a solar farm), which represents a significant impact. Energy Commission staff is proposing Conditions of Certification to ensure that the proposed project mitigates the permanent loss of 640 acres of agricultural lands; and to ensure that the project is constructed and operated in accordance with the San Luis Obispo County's minimum development standards for Electric Generating Plants in the Agriculture (AG) zone. Staff will continue to work with San Luis Obispo County to determine the project's compliance with chapter 22.32.030 of the San Luis Obispo County Land Use Ordinance, which addresses project bonding, environmental quality assurance, conditions for clearing and revegetation and utility interconnections.

NOISE

Staff concludes that the CESF project, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration LORS. However, at this time, staff concludes that the project would cause significant adverse noise impacts on people within the affected area during both construction and operation. Staff needs the applicant to prepare a draft Noise Mitigation Plan that demonstrates that the significant noise impacts identified for project construction and operation can be reduced to less than significant. Staff will need to evaluate this plan before drawing further conclusions in the FSA.

With respect to the impact of construction noise affecting several residences, staff considers the estimated construction impacts resulting in more than doubling the ambient noise levels to be significant considering the magnitude of noise increase and that the duration of effects would not be short-term when accounting for the 35-month construction period. Staff is requesting the applicant to consider a range of mitigation measures that could include one or more of the following: installation of temporary and portable sound walls, the spreading of high peak noise activities so that they would not occur simultaneously, building temporary earth berms around the construction site or near the affected receptors, implementing additional equipment mufflers, and using quieter equipment.

With respect to operational noise impacts affecting one residence located approximately 3,230 feet north of the center of the proposed CESF power block, additional mitigation

measures would need to be implemented to reduce estimated project-related noise levels at the residence. There are many feasible mitigation measures available to the applicant. Examples of these measures include employing quieter equipment, such as super low-noise air cooled condenser fans instead of the low-noise fans currently selected for the project, locating the power block further away from this residence, erecting sound walls around the noisiest equipment, and implementing mitigation measures at the residence. In addition, staff is requesting the applicant to explore options for using battery powered vehicles and lighting for night-time mirror washing to avoid disturbance from vehicle and generator engines to residents outside of their homes.

SOIL AND WATER

Staff has not identified any potentially significant impacts to Soil and Water Resources which cannot be mitigated and believes the project will comply with all applicable LORS provided the proposed conditions of certification are implemented. Staff concludes the following:

- Implementation of Best Management Practices (BMPs) during CESF construction in accordance with effective Storm Water Pollution Prevention Plans and a Drainage, Erosion and Sedimentation Control Plan would avoid significant adverse effects that could otherwise result in significant transport of sediments and/or contaminants from the site by wind or water erosion.
- The proposed use of groundwater for the project's process and potable water needs would not cause a significant adverse environmental impact or affect current or future users of groundwater.
- Groundwater from the lower aquifer is the most degraded quality water supply reasonably available to the project and staff considers the project consistent with state water use and conservation policies.
- The project would not be located within the 100-year flood plain, and would not exacerbate flood conditions downstream of the project.
- The proposed recovery of process wastewater using Zero-Liquid-Discharge technology is consistent with state water use and conservation policies.

However, staff has identified several potentially significant impacts that must be addressed with mitigation identified in the Final Staff Assessment, including:

- Two crossings of Carriza Creek may increase flooding upstream of the crossings. The applicant should re-examine the need for these crossings to determine if the project can be successfully constructed without placing fill in an existing stream channel. The crossing designs need to be updated to ensure that upstream flood elevations are not increased as compared to existing conditions.
- Water supply for construction appears to be significantly under-estimated. The applicant should provide clear documentation demonstrating that all construction requirements (including dust suppression) can be successfully accomplished with the estimated water supply.

- The applicant indicates that the proposed perimeter swales will capture and detain the first 117 acre-feet of runoff from two up-gradient watersheds. On the Carrizo Plain, with extremely limited water resources, capturing and detaining up-gradient runoff could result in potentially significant impacts to down-gradient surface water resources including Carriza Creek and Soda Lake and groundwater users. The applicant should include provisions for this runoff to pass through the CESF project site.
- Potable water supply estimates are 5.3 gpm for average annual (averaged over 8,760 hours) and maximum daily usage. The applicant should confirm the average annual and maximum daily potable water supply estimates.
- The proposed sanitary waste water system includes a 1,000 gallon septic tank and leach field. However, the septic tank appears to be undersized given the number of employees and the applicant's estimate of potable water supply. The applicant should provide clear documentation demonstrating that the septic system has been designed in accordance with San Luis Obispo County and California Plumbing Code standards.
- Infiltration BMPs should be added to the detention/infiltration areas to limit the potential for extended shallow ponding and resulting increased mosquito production.
- BMPs for the post-construction period should be identified to ensure stabilization of soils in the laydown area and at the Solar Field.

TRAFFIC AND TRANSPORTATION

Staff has analyzed the traffic-related information provided in the Application for Certification and other sources and concludes that the Carrizo Energy Solar Farm project would have significant adverse traffic and transportation-related impacts. Staff also concludes that the applicant needs to further evaluate and propose additional mitigation measures that could reduce or eliminate the significance of these impacts.

Traffic generated during construction, particularly equipment deliveries during construction that would require pilot cars and/or California Highway Patrol escorts, would result in substantial delays (i.e., up to 31 minutes) to vehicle traffic along State Route 58 (SR-58), resulting in a significant, adverse direct and cumulative impact. To reduce the extent of this significant impact and to reduce the potential for conflicts between construction traffic and existing traffic along SR-58, staff has proposed a Condition of Certification that would reduce impacts during the morning and evening peak hours. However impacts during off-peak hours would remain and would be significant. Staff continues to investigate measures to reduce this impact. In order for staff to complete its analysis for the Final Staff Assessment, the applicant needs to prepare and provide staff with a comprehensive draft Traffic Mitigation Plan that identifies feasible mitigation strategies to reduce significant adverse impacts associated with project construction.

Staff has also recommended additional Conditions of Certification to ensure the repair of physical damage to area roadways caused during project construction and to ensure safe access to the project site. The CESF as proposed would be consistent with all applicable laws, ordinances, regulations, and standards, including the County of San

Luis Obispo traffic thresholds and the Circulation Element of the Kern County General Plan.

VISUAL RESOURCES

The CESF, a proposed thermal solar project covering 640 acres, is the first project of its kind that Energy Commission visual resource staff has had to evaluate for visual impacts. The size of the project, in the setting of the sparsely populated area where it is proposed, presents staff with complex aesthetic issues related to the transformation of northern Carrizo Plain by this project, as well as by the cumulative impact of nearby renewable energy facilities. Thus, there is a potential that the project may have a substantial negative effect on the environment of persons in general, including public and private views and other features of beauty. At this time staff is unable to form final conclusions whether the operation of the Carrizo Energy Solar Project as proposed would create and aesthetic impact under the California Environmental Quality Act (CEQA) and Guidelines or whether the project would be consistent with applicable laws, ordinances, regulations and standards (LORS) pertaining to aesthetics and the preservation and protection of sensitive visual resources.

To ensure that an appropriate analysis is conducted for this project, staff is taking time between the Preliminary and Final Staff Assessments to incorporate additional information and consider its' impact upon the visual integrity of the area. Yet to be considered is additional information related to the construction laydown area, landscaping, a review of the glint and glare study and cumulative impacts. Conclusions on the project's CEQA visual impact significance and LORS compliance will be provided in the Final Staff Assessment.

Additional information needed to complete the analysis for the Final Staff Assessment includes the following:

- A description by the applicant of the colors and materials of the buildings and structures, a lighting plan, and site screening for the laydown area.
- Clarification by the applicant as to whether the 50-foot wide ingress, egress and public utility easement and road dedication between the Topaz property on section 29 and the Carrizo project on section 28 would prohibit or limit the planting of landscaping along the Carrizo project's west boundary.
- A perimeter landscaping plan has not been prepared for the project site and reviewed by staff at this time.
- Staff's securing of a consultant to review and provide comments on the applicant's glint and glare study.
- Information to evaluate potential cumulative visual impacts to the area regarding lighting, glare and glint, surface treatments, and landscaping or screening proposed by the Topaz Solar Farm and California Valley Solar Ranch.

ALTERNATIVES SUMMARY

The “Guidelines for Implementation of the California Environmental Quality Act,” Title 14, California Code of Regulation, Section15126.6(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)).

In the analysis of the Carrizo Energy Solar Farm (CESF), six alternative project sites were examined, as well as several alternative generation technologies. The alternative sites would not reduce or avoid all significant and potentially significant impacts to Biological Resources, Noise, Traffic and Transportation and Visual Resources. Some of the alternative technologies could achieve most of the project objectives, but would likewise not substantially lessen or avoid environmental impacts. An alternative site configuration for the placement of the power block could reduce significant noise levels.

The six alternative sites are similar to the proposed project in size and land characteristics, and are located within reasonable proximity to transmission infrastructure. None of the sites, however, are considered to be superior to the applicant’s proposed site. The Lokern site in Kern County has insufficient solar insolation. The Harper Lake site in San Bernardino County offers strong solar resources, but contains important biological habitat. The Old Mine and Daggett-Soppeland sites in San Bernardino County, in close geographic proximity to Harper Lake, were not retained because of similar expected impacts and because they, as well as the Harper Lake site, would not interconnect to Pacific Gas and Electric’s (PG&E) transmission system. The Northwest Carrizo Plain site could interfere with the same migration corridors as the proposed site, and the Antelope Plain site north of the Carrizo region would also have likely impacts to biological resources. However, staff cannot conclude whether significant impacts to wildlife (pronghorn, tule elk and San Joaquin kit fox) would be reduced to less than significant by considering an alternate site until staff, the California Department of Fish and Game, San Luis Obispo County and U.S. Fish and Wildlife Service complete their analysis/modeling of wildlife movement and corridor needs.

Alternative solar technologies (parabolic trough, photovoltaic, Stirling dish, and distributed tower power) were considered. As with the proposed Compact Linear Fresnel Reflector (CLFR) technology, these technologies would consume little on-site water and would not generate air pollutants. Yet with similar or greater acreage requirements, they would not lessen the environmental impacts associated with extensive land use. Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the project. Geothermal, tidal, and wave alternatives are not applicable to the Carrizo Plain. Wind power is not considered a feasible alternative as the Carrizo Plain is not identified as a productive area for development of commercial wind power. Biomass would not be practical due to the need to transport biomass fuels from outside the area which would create significant and long-term traffic impacts. Finally, a natural gas plant would not

meet the project's renewable generation objective, and construction of new nuclear power plants is currently prohibited under California law.

Staff also believes that the "no project" alternative is not superior to the proposed project. The "no project" scenario would likely delay development of renewable resources, and could lead to increased operation of existing plants, which use non-renewable technologies. Furthermore, PG&E would not receive the 177 MW contribution to its renewable procurement requirement.

Therefore, while staff does not recommend alternative generation technologies over the technology proposed by Carrizo Energy, LLC, it is unable to conclude at this time whether an alternative site would meet project objectives and mitigate significant impacts to Noise and Traffic and Transportation, and potentially significant impacts to Biological Resources, Soil and Water, and Visual Resources. However, staff believes relocating the power block to an area more central to the CESF site arrangement would mitigate significant operational noise to less than significant levels. The power block would have to be moved approximately 1,000 feet toward the center of the project site from where it is currently planned to be located.

NOTEWORTHY PUBLIC BENEFITS

CESF offers the benefit of providing 100% renewable energy from the sun, and will not require any fossil fuels as some solar thermal facilities utilize to augment their power production. The daylight operating hours of the day generally coincide with the normal hours when peaking capacity and energy is needed to support the California ISO transmission grid. In addition, staff has identified the following public benefits:

1. CESF would utilize the Compact Lineal Fresnel Reflector (CLFR) solar technology, which with parabolic trough designs, are considered to be roughly twice as efficient in use of land (at approximately 0.28 MW/acre or 3.6 acres/MW) compared to other less-efficient solar technologies;

2. CESF would contribute to meeting goals under California's Renewable Portfolio Standard Program (Senate Bill 1078), which establishes that the state's renewable energy must contribute 20% of the supply for meeting total state energy demands by 2010, and which also reduces our dependence on fossil fuels;

3. CESF would contribute to meeting the Governor's Executive Order #S-14-08 which establishes that the state's renewable energy must contribute 33% of the supply for meeting total state energy demands by 2020;

4. CESF would contribute to the state accomplishing its goals for reducing global carbon emissions in accordance with the California Global Warming Solutions Act of 2006 (Assembly Bill 32);

Staff has identified additional noteworthy Socioeconomics public benefits which would include both short term construction-related and long term operational-related increases in local expenditures and payrolls, as well as sales tax revenues.

RECOMMENDATIONS AND SCHEDULE

For a more detailed review of potential impacts, see staff's technical analyses in the PSA. Staff has listed the outstanding issues as applicable in the technical sections of the PSA. To resolve these issues, staff requires either additional data, further discussion and analysis, or is awaiting conditions from a permitting agency prescribing mitigation.

In conclusion, based on the information available at this time, staff will work to resolve the outstanding issues and to update our preliminary conclusions for the FSA. The project is being reviewed under the 12-month AFC process. However, consistent with the Governor's Executive Order #S-14-08, staff will coordinate closely with CDFG and other agencies to expedite the schedule to the extent possible while not compromising the quality of staff's analysis in the interest of protecting the environment and local community interests. Staff will conduct public workshops on the PSA within 30 days of its publication during a date to be determined in December 2008. Staff anticipates publication of the Final Staff Assessment (FSA) in either February or March 2009, which will address all comments on the PSA.

INTRODUCTION

John Kessler

PURPOSE OF THIS REPORT

This Preliminary Staff Assessment (PSA) is the California Energy Commission staff's independent analysis of the proposed Carrizo Energy Solar Farm (here after referred to as CESF). This PSA is a staff document. It is neither a Committee document, nor a draft decision. The PSA describes the following:

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

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

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

ORGANIZATION OF THE PRELIMINARY STAFF ASSESSMENT

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

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

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

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

ENERGY COMMISSION SITING PROCESS

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

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

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

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

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

Staff will provide a comment period to resolve issues between the parties and to narrow the scope of adjudicated issues in the evidentiary hearings. During the period after the publishing of the PSA, staff will conduct one or more workshops to discuss its findings, proposed mitigation, and proposed compliance-monitoring requirements. Based on the workshops and written comments, staff may refine its analysis, correct errors, and finalize conditions of certification to reflect areas where agreements have been reached with the parties, and publish a Final Staff Assessment (FSA).

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

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

AGENCY COORDINATION

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

Corps of Engineers, California Coastal Commission, State Water Resources Control Board/Regional Water Quality Control Board, California Department of Fish and Game, and the California Air Resources Board.

OUTREACH

The Energy Commission's outreach program is primarily facilitated by the Public Adviser's Office (PAO). This is an ongoing process that to date has involved the following efforts:

LIBRARIES

On November 7, 2007, the Energy Commission staff sent the CESF AFC to the San Luis Obispo County Library, Santa Margarita Public Library, Simmler Public Library, Creston Public Library and to libraries in Eureka, Fresno, Los Angeles, Sacramento, San Diego, and San Francisco.

INITIAL OUTREACH EFFORTS

The PAO's public outreach is an integral part of the Energy Commission's AFC review process. The PAO reviewed information provided by the applicant and also conducted its own outreach efforts to identify and locate local elected and certain appointed officials, as well as "sensitive receptors" (including schools, community, cultural and health facilities, daycare and senior-care centers, as well as environmental and ethnic organizations) within a six-mile radius of the proposed site for the project.

The PAO provided notification by letter and enclosed notice of the January 29, 2008 Informational Hearing and Site Visit to the Carriza Plains Elementary School, residents living within 6 miles of the proposed project and representatives of environmental, Native American, and certain public interest and regulatory organizations with an expressed or anticipated interest in this project. Also, elected and certain appointed officials of San Luis Obispo County were similarly notified of the hearing and site visit. The PAO also contacted the most prominent radio and television stations in the area and requested public service announcements for the January 29th hearing and site visit. The local TV station, broadcasting from the City of San Luis Obispo, agreed to make public service announcements, and the *San Luis Obispo Telegram--Tribune* newspaper agreed to publicize the hearing and site visit on its community calendar of upcoming public events. The Information Hearing and a Site Visit for the CESF project was conducted on January 29, 2008 at the Carrisa Plains Heritage Association Community Center near Simmler and California Valley.

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

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 U.S. Environmental Protection Agency (USEPA) and all other federal agencies (as well as state agencies receiving federal funds) 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 and/or low-income populations.

For all siting cases, Energy Commission staff conducts an environmental justice screening analysis in accordance with the “Final Guidance for Incorporating Environmental Justice Concerns in USEPA’s National Environmental Policy Act (NEPA) Compliance Analysis” dated April 1998. The purpose of the screening analysis is to determine whether a minority or low-income population exists within the potentially affected area of the proposed site.

California Statute, Section 65040.12 (c) of the Government Code, defines “environmental justice” to mean “fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.” Staff’s specific activities, with respect to environmental justice for the CESF project, are discussed in the **Executive Summary**.

PROJECT DESCRIPTION

John Kessler

INTRODUCTION

Ausra CA II, LLC (dba Carrizo Energy, LLC) (also referred to as applicant), filed an Application for Certification (AFC) to the California Energy Commission (Energy Commission) on October 25, 2007, to construct and operate a solar thermal power plant. The first supplement to the AFC was filed on December 17, 2007 to satisfy information requirements. A second supplement to the AFC was filed on July 3, 2008, describing design changes to the proposed project. The primary changes consist of proposing that the solar reflectors be aligned in a north-south rather than an east-west direction, rotating and relocating the power block slightly east of the original location along the northern site boundary, reducing the length of the two air-cooled condensers and their number of cells from twenty-four to twenty each, and reducing the number of steam drums from twenty to eight in the solar field and from two to none in the power block. The modifications also include the proposal to construct a temporary 40,000 square foot manufacturing building at the laydown area that would house robotic welding equipment for fabricating the solar collectors.

PROJECT PURPOSE AND OBJECTIVES

As described in the AFC, the applicant‘s objectives are to generate and sell clean, renewable, solar-powered electricity in accordance with the contractual requirements of the power purchase agreement (PPA) and the legal and regulatory requirements of the State of California. The proposed project has been designed and developed to conform to the requirements of the 20-year PPA between a major California utility and the applicant.

The CESF AFC identifies several basic objectives for the development of the proposed power project. These objectives include:

- To comply with provisions of the PPA, and develop a project with the potential to achieve an initial commercial on-line date in 2010;
- To safely and economically provide an efficient, reliable, and environmentally sound solar power generating facility in San Luis Obispo County capable of selling competitively priced renewable energy consistent with the needs of the surrounding areas, as well as provide additional generating capacity for the State and region as a whole;
- To minimize infrastructure needs and reduce environmental impacts by locating the plant near existing infrastructure, including: PG&E transmission lines and substation, and an adequate water supply without requiring significant modifications to the regional system;
- To avoid siting the plant in areas that are highly pristine or biologically sensitive;
- To site the facility in areas with high solar energy potential and consistent with existing land use plans which call for renewable energy development; and

- To assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with State Policy, including the policy objectives set forth in Senate Bill (SB) 1078(California Renewable Portfolio Standard Program) and Assembly Bill (AB) 32 (CaliforniaGlobal Warming Solutions Act of 2006).

PROJECT LOCATION

The proposed 640-acre project site is located immediately adjacent to California State Route 58 (SR-58)/Carrisa Highway, approximately 3 miles west of Simmler in eastern San Luis Obispo County. The CESF site currently consists of disturbed dry farmed land and abandoned farm structures, and is in an area zoned for agricultural uses as specified in the San Luis Obispo County General Land Use Plan. Electrical generation is listed in the San Luis Obispo County Land Use Ordinance as an allowed use within the agricultural zone. The land adjoining the proposed project is primarily open, undeveloped land. The 380-acre construction laydown area is located south and adjacent to the proposed project site, and is divided from the project site by SR-58. Main access to the CESF and the general vicinity will be provided via SR-58, immediately south and adjacent to the site. **Project Description Figures 1 and 2** show the regional and local settings for the proposed project respectively.

PROJECT FEATURES

SOLAR FIELD AND GENERATING EQUIPMENT

The CESF would consist of approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines. Each line contains 10 rows of reflectors divided into 4 segments. In addition, the project would include associated steam drums, steam turbine generators (STGs), air cooled condensers (ACCs), and infrastructure. The proposed project design would incorporate Ausra's proprietary CLFR technology consisting of a series of slightly curved linear solar reflectors that concentrate solar energy on pipes in an elevated receiver structure approximately 17 m (56 feet) tall.

The concentrated solar energy boils water within a row of specially coated stainless steel pipes in an insulated cavity to produce saturated steam. The steam produced in the receivers is collected in a series of pipes, routed to eight steam drums located in the solar field, and then to two STGs in the power block. The STGs would exhaust to an exhaust trunk, which carries the steam to be condensed in the ACCs. The condensed steam would then be returned as water to the solar field for steam production, minimizing water use at the CESF. All auxiliary cooling systems are closed-loop with fin-fan air coolers. The STGs provide the driving force to spin the generator, which converts the mechanical energy into electrical output. The two STGs would be rated at 93 megawatts (MW) gross capacity each and would generate electricity at 13.8 kV. With plant auxiliary loads, the net plant capacity would be 177 MW (CESF 2007a).

SWITCHYARD AND TRANSMISSION LINE

The CESF would include the construction of a new 230 kilo-volt (kV) switchyard located adjacent to the two STGs. To provide transmission level voltage, the electricity generated will be stepped up using two 13.8/230 kV generator step-up transformers. A

new double-circuit 230 kV overhead transmission line, approximately 850 feet in length, will interconnect the CESF switchyard to Pacific Gas and Electric's (PG&E's) new loop-in switching station that would also be located within the CESF site along the northern project boundary. Another 90-foot long double circuit 230-kV line would tie PG&E's switching station to the existing Morro Bay–Midway #1 230 kV line located immediately outside the northern project boundary and running west to Morro Bay Powerplant and east to Midway Substation. The loop-in switching station serves as the project's point of interconnection and would reroute the Morro Bay–Midway #1 230 kV line through the switching station. **Project Description Figure 3** shows the general arrangement of the proposed power block of the CESF development and **Project Description Figure 4** shows a visual simulation of the proposed project as conceived by the applicant (CESF 2008h).

WATER SUPPLY

The project is expected to consume approximately 21.8 acre-feet of water per year as provided from an existing onsite well to meet all process and potable needs. The well draws water from a lower aquifer at a depth of approximately 591 feet below ground surface. Water would be required for make-up to the solar thermal and steam turbine system, washing of solar reflectors and collectors, potable water, service water, and fire protection. The water is expected to be treated on-site to varying degrees depending on use. The water would be treated using a skid-mounted water treatment system as provided by a contract service. The treatment system would be comprised of equipment for filtering, softening, demineralizing, and sanitizing the raw water (CESF 2007a).

WASTEWATER

Wastewater generated in the power block would be collected and treated as necessary for reuse. Steam drum blowdown condensate would be returned to the onsite raw water storage tank. Water draining from equipment drains would pass through an oil/water separator, and the clear discharge would be further treated using a carbon filter before being routed to the raw water storage tank. Stormwater would be collected onsite and directed to swales and detention areas for percolation into the ground. The sanitary system would consist of an underground septic tank and leach field (CESF 2007a).

PROJECT CONSTRUCTION AND OPERATION

If approved by the Energy Commission, the applicant proposes to begin project construction during the first quarter of 2009 and take 35 months to complete. Construction is expected to cost approximately $500 million. The applicant expects that the initial portion of the facility could be online on or before May 2010, and that full capacity and commercial operation is expected to begin in the first quarter of 2012. Typical operating hours for the project would be an average of approximately 13 hours per day equating to an annual average of 4,765 hours per year (CESF 2007a).

FACILITY CLOSURE

The CESF would be designed for an operating life of 30 years. At an appropriate point beyond that, the project would cease operation and close down. At that time, it would 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 setting for this project does not appear to present any special or unusual closure problems, it is impossible to foresee what the situation would be in 30 years or more when the project ceases operation. Therefore, provisions must be made which provide the flexibility to deal with the specific situation and project setting at the time of closure. Facility closure would be consistent with laws, ordinances, regulations and standards in effect at the time of closure.

OTHER SOLAR PROJECTS PROPOSED FOR THE CARRIZO PLAINS

In addition to the proposed solar-thermal CESF project being reviewed under the Energy Commission's AFC licensing process, two photovoltaic (PV) projects are proposed for development in the Carrizo Plains that fall under the permitting authority of San Luis Obispo County. These include Optisolar's 550 MW Topaz Solar Farm that would be located immediately north of the CESF on an approximately 6,200-acre site, and SunPower's 250 MW California Valley Solar Ranch that would be located approximately 5 miles east of the CESF project on an approximately 2,200-acre site.

Optisolar proposes to construct their project in two phases, with the first phase to be developed on lands outside of the Williamson Act agricultural preserve program that would produce 210 MW, and the second phase to be developed on lands currently encumbered by Williamson Act contracts that would produce 340 MW. If approved, the initial phase could begin construction in 2010 and begin producing power for a portion of the Phase I development in 2011, progressing to the full 210 MW by 2012. Assuming Williamson Act contract cancellation, Phase II would be constructed over a second 3-year time span beginning sometime after completion of Phase I. SunPower proposes to construct their project over a 3-year time span beginning in 2010, and producing power for a portion of the completed project beginning in 2011.

The status of these two PV projects at the time of this PSA is that Optisolar has filed their Conditional Use Permit application with the county, and SunPower is expected to do so shortly. Staff has received a copy of the Optisolar application, and was able to utilize it for the Cumulative Impacts analysis contained with this PSA. However, the Sun Power application is not yet available, and thus staff will not be able to consider more detailed information about the California Valley Solar Ranch project until SunPower files its application. **Project Description Figure 5** shows the proximity of the three proposed solar projects to each other, and **Project Description Figure 6** shows the CESF and Optisolar projects in proximity to nearby residences and undeveloped residential lots.

REFERENCES

CESF 2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

CESF 2008h – Carrizo, LLC/A. Lieba URS (tn: 46925) AFC Supplement. Dated 7/3/2008. Submitted to CEC/Melissa Jones/Dockets on 7/3/2008.

PROJECT DESCRIPTION - FIGURE 1

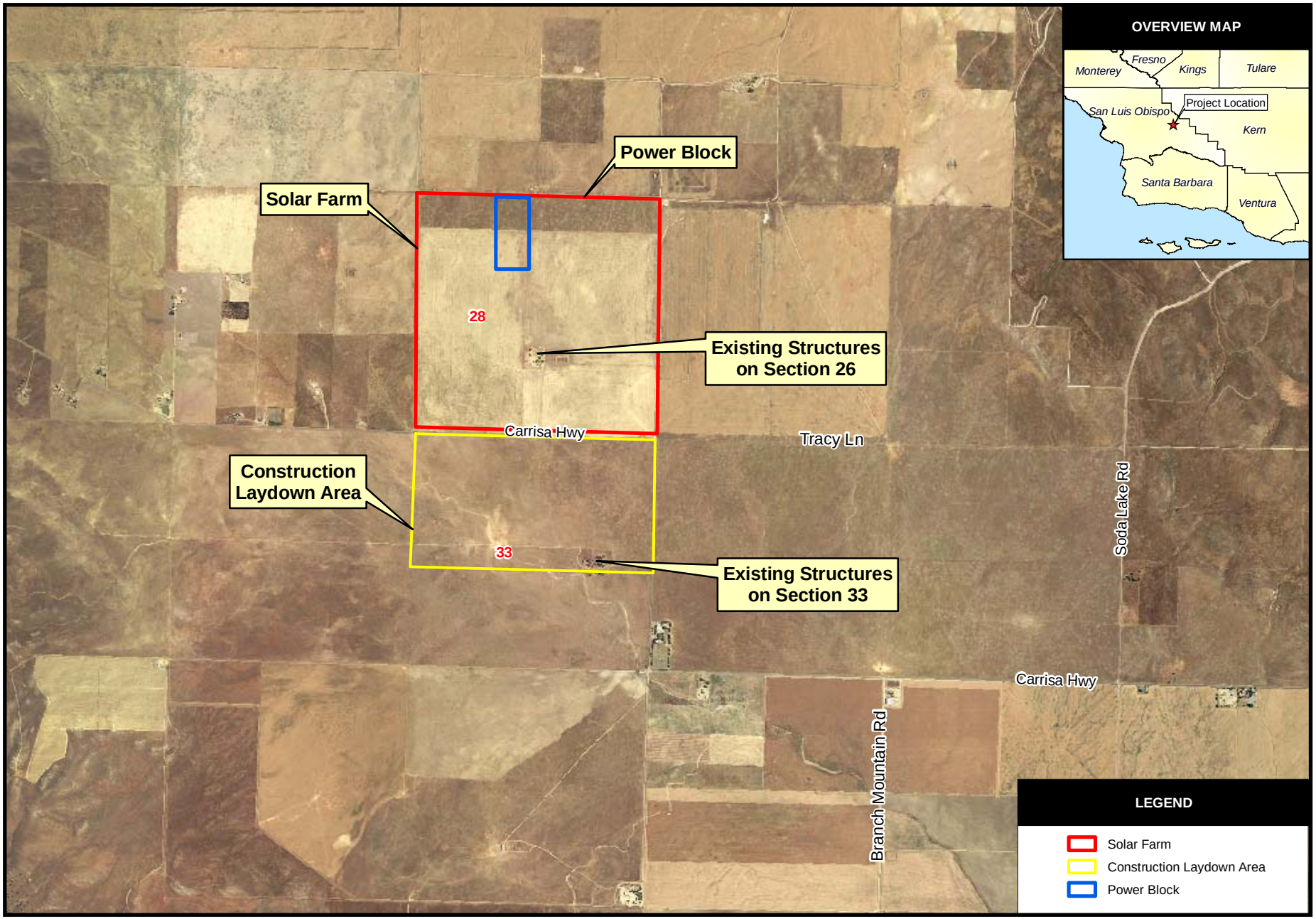
Carrizo Energy Solar Farm - Regional Setting

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: AFC Figure 1.1-1

PROJECT DESCRIPTION - FIGURE 2

Carrizo Energy Solar Farm - Local Setting

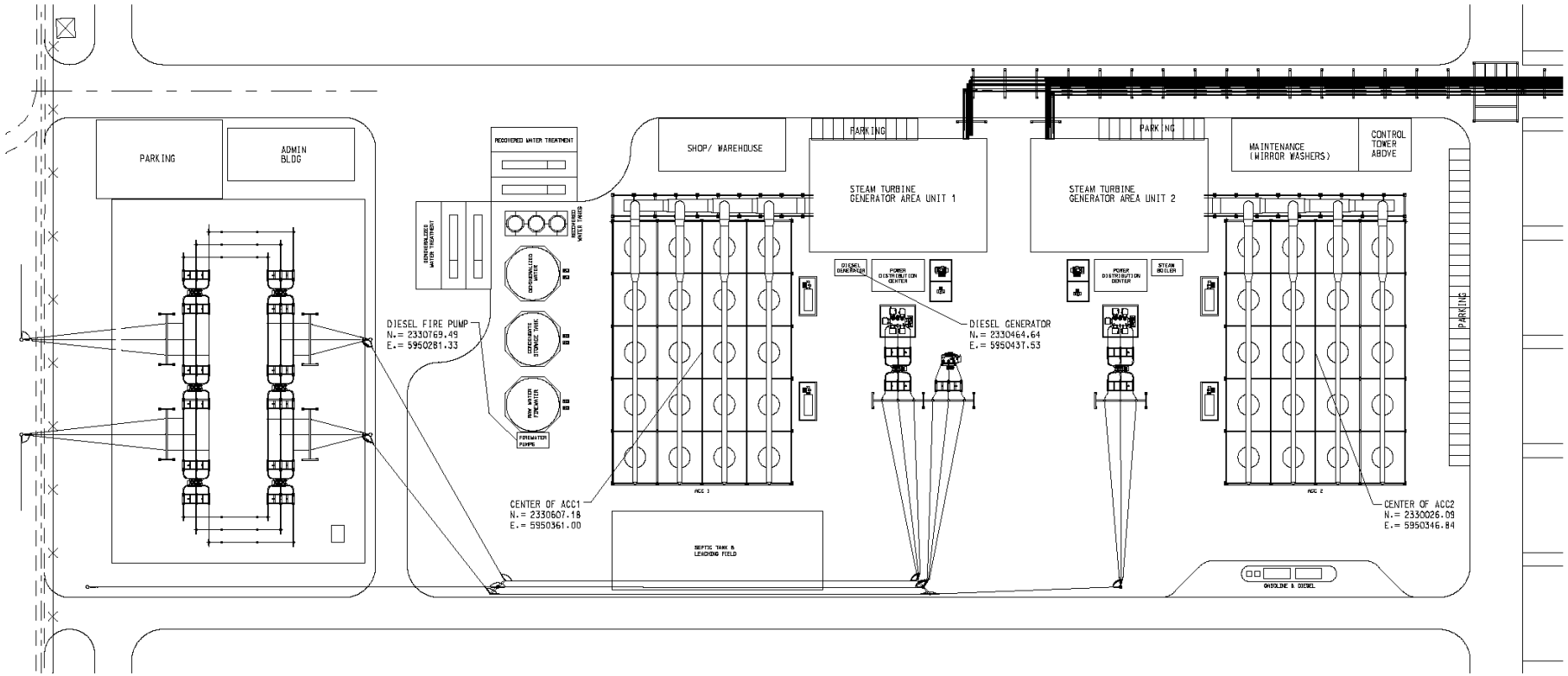


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: AFC Supplement Figure 1.5-1

PROJECT DESCRIPTION - FIGURE 3

Carrizo Energy Solar Farm - General Arrangement of Project



SOURCE: AFC Supplement Figure 1.2-4

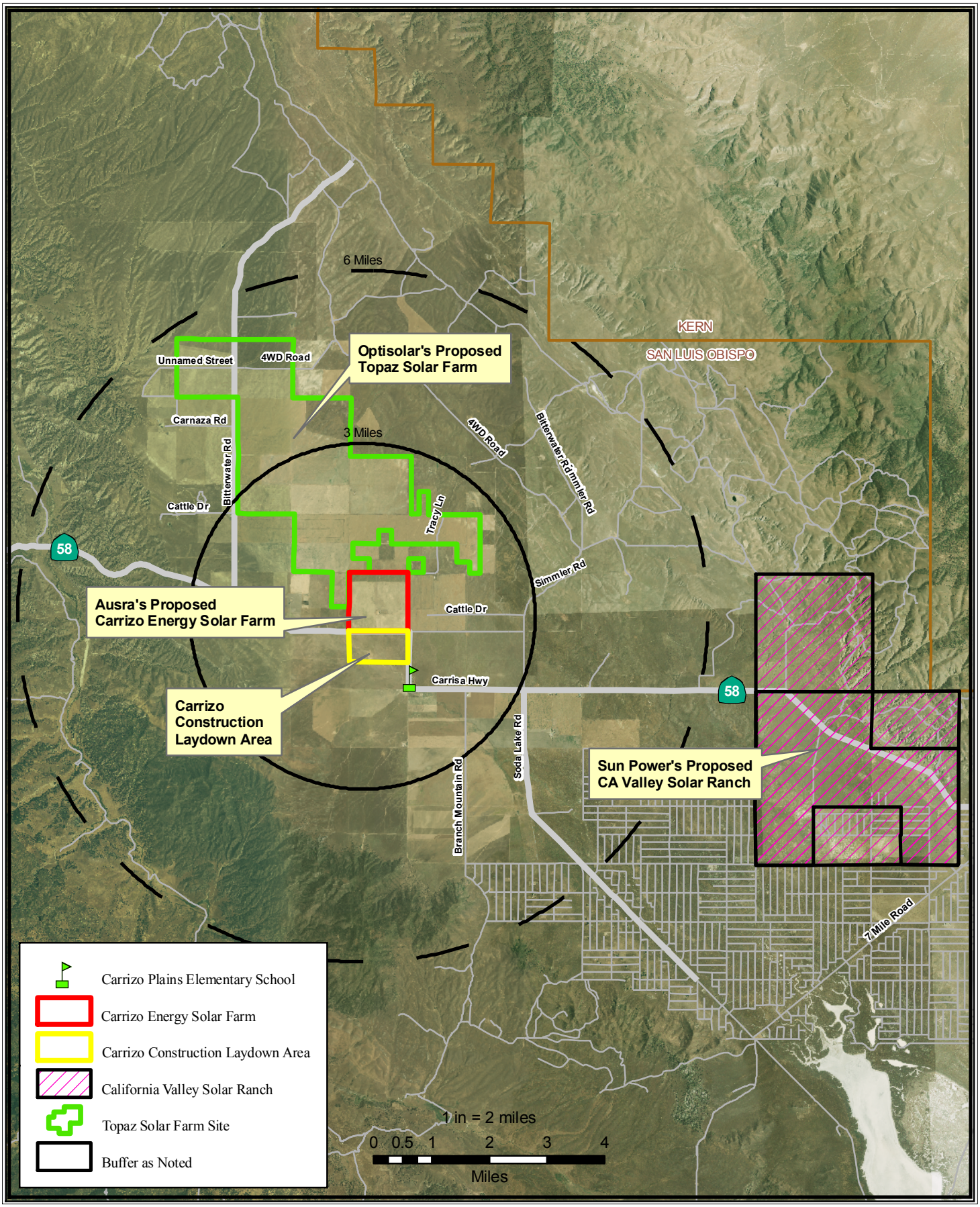
PROJECT DESCRIPTION - FIGURE 4

Carrizo Energy Solar Farm - Simulation of Proposed Project

SOURCE: AFC Supplement Figure 1.2-5

PROJECT DESCRIPTION - FIGURE 5

Carrizo Energy Solar Farm - Proximity of 3 Proposed Solar Projects in Carrizo Plains

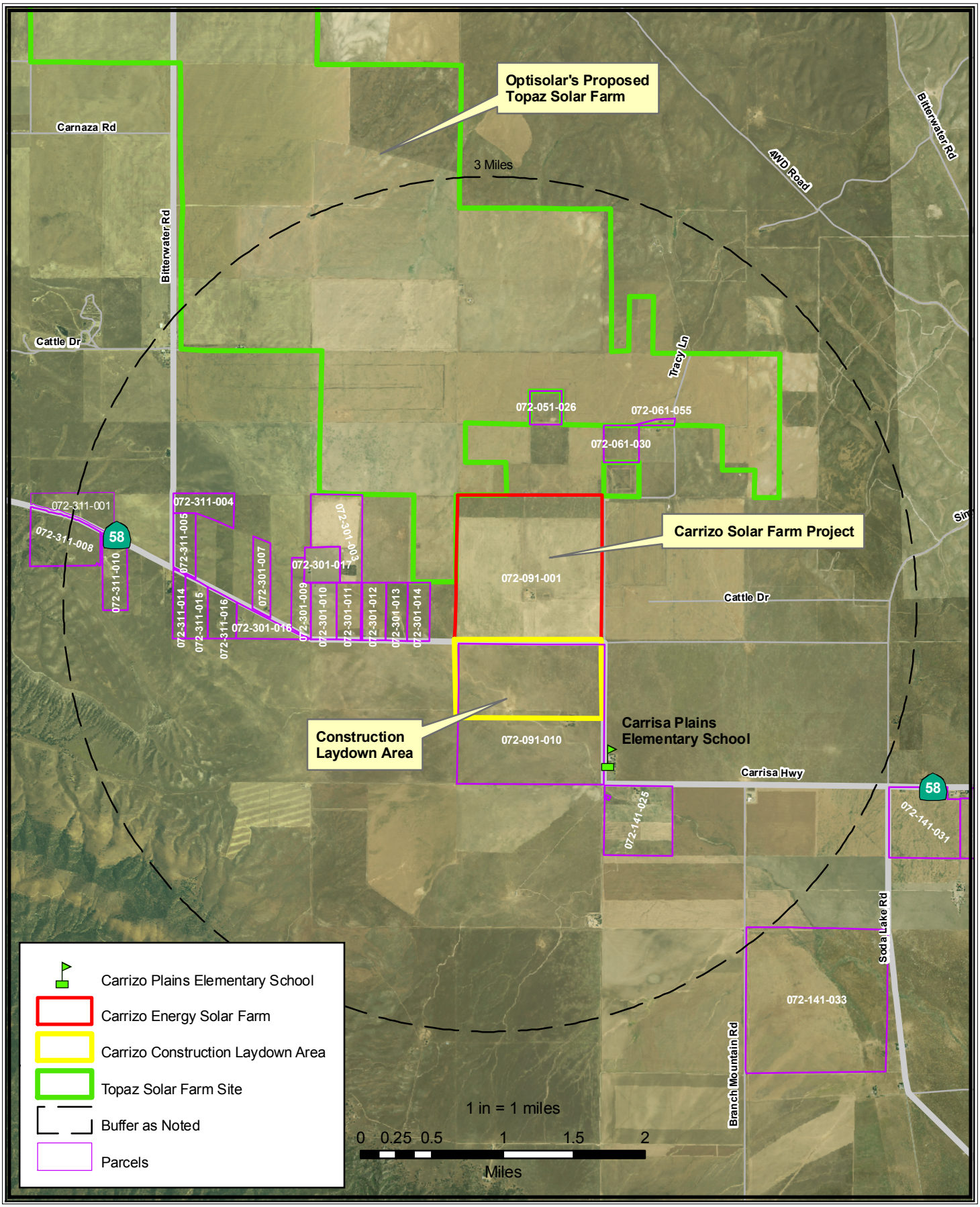


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: Tele Atlas Data - 2008; USDA NAIP IMAGERY - 2005

PROJECT DESCRIPTION - FIGURE 6

Carrizo Energy Solar Farm - Proximity of Carrizo & Topaz Solar Farms to Nearby Residences and Lots



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: Tele Atlas Data - 2008; USDA NAIP IMAGERY - 2005

ENVIRONMENTAL ASSESSMENT

AIR QUALITY

Tuan Ngo, P.E. and Matthew Layton, P.E.

SUMMARY OF CONCLUSIONS

Staff finds that with the adoption of the attached conditions of certification the proposed Carrizo Energy Solar Farm (CESF) would comply with all applicable laws, ordinances, regulations, and standards (LORS) and would not result in any significant air quality-related impacts.

The CESF project would emit significantly fewer greenhouse gases (GHG)[1] than fossil fueled generation resources in California. The project is not subject to the requirements of SB 1368 (Perata, Chapter 598, Statutes of 2006) and the Emission Performance Standard, but would nevertheless comply with the Emission Performance Standard.

INTRODUCTION

On October 25, 2007, Carrizo Energy, LLC (applicant) submitted an Application for Certification (AFC) to construct and operate a solar power plant in the Carrizo Plain area, an unincorporated area within eastern San Luis Obispo County. The project site is located on a 640 acre parcel immediately to the north of Highway 58. The facility includes 195 compact linear fresnel reflector solar concentrating lines, associated steam drums, steam turbine generators, and air cooled condensers to produce up to 177 megawatt (MW) net of electrical power.

This analysis evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the Carrizo project. Criteria air pollutants are defined as air contaminants that the state and/or federal governments have established an ambient air quality standard to protect public health.

The criteria pollutants analyzed are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and particulate matter (PM). Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter - PM10) and fine particulate matter (less than 2.5 microns in diameter - 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 project are discussed in an appendix and analyzed in the context of cumulative impacts.

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

1 Greenhouse gas 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.

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

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Air Quality Table 1 summarizes the applicable LORS. The San Luis Obispo County Air Pollution Control District issued an Authority to Construct (A/C) for the diesel fuel-fired pump and the emergency engines, the only on-site equipment subject to their rules. The A/C, or determination of compliance with District rules and regulations, issued September 29, 2008, included a set of air quality permit conditions that ensure continuous compliance during construction of the facility and operation of permitted equipment. Staff has incorporated the District conditions into this Preliminary Staff Assessment.

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

Applicable LORS	Description
Federal	New Source Review: Best Available Control Technology (BACT) and Offset requirements
	Title V: Federal permit
State	California Health and Safety Code: Permitting of source needs to be consistent with approved Clean Air Plan.
Local	Regulation II: Permits: Best Available Control Technology (BACT), offsets, and new sources shall not cause or make worse a violation of an Ambient Air Quality Standard.
	Regulation IV: Particulate Matter and Visible Emissions: Emissions shall not be darker than Ringelmann No. 1 for a continuous three-minutes, and no more than 0.1 grains PM per standard dry cubic foot.

SETTING

CLIMATE AND METEOROLOGY

The project is located in the Carrizo Plain, an inland area of the county of San Luis Obispo at approximately 2,000 feet above sea level. The area is relatively arid, with dry summers and mild winters. The aridity of the region is caused by the influence of a

Pacific high-pressure system off the coast of California and topographical barriers that effectively block the flow of moisture to the region. Seasonally, the precipitation totals in the area range from lows of 0.4 inch in the spring to as high as 2.0 inches in the winter. Total annual precipitation averages less than 8 inches.

The most recent meteorological (weather) data was collected at La Panza, located approximately 8 miles west of the project site, for 2001 through 2005. The measured wind data are graphically represented by quarterly wind roses, which are provided in the AFC Appendix I.D (CESF2007a). These wind roses show that for most of the year, the winds are predominately from the south, southeast and north, northwest.

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 (USEPA). 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).

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.

Air Quality Table 2
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone (O_3)	1-hour	0.09 ppm (180 $\mu g/m^3$)	None	Same as primary
	8-hour	0.07 ppm (137 $\mu g/m^3$)	0.08 ppm (157 $\mu g/m^3$)	
Particulate Matter (PM10)	Ann.Geo. Mean	20 $\mu g/m^3$	---	Same as primary
	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	
	Ann.Arit. Mean	---	50 $\mu g/m^3$	
Fine Particulate Matter (PM2.5)	24-hour	No separate standard	35 $\mu g/m^3$	Same as primary
	Ann.Arit. Mean	12 $\mu g/m3$	15 $\mu g/m^3$	
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	---
	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	
Nitrogen Dioxide (NO_2)	1-hour	0.25 ppm (470 $\mu g/m^3$)	---	Same as primary
	Ann.Arit. Mean	---	0.053 ppm (100 $\mu g/m^3$)	
Lead (Pb)	30-day	1.5 $\mu g/m^3$	---	Same as primary
	Cal. Quarter	---	1.5 $\mu g/m^3$	
Sulfur Dioxide (SO_2)	Ann.Arit. Mean	---	0.03 ppm (80 $\mu g/m^3$)	---
	24-hour	0.04 ppm (105 $\mu g/m^3$)	0.147 ppm (365 $\mu g/m^3$)	---
	3-hour	---	---	0.5 ppm (1300 $\mu g/m^3$)
	1-hour	0.25 ppm (655 $\mu g/m^3$)	---	---
Sulfates (SO_4)	24-hour	25 $\mu g/m^3$	No federal standard	
H_2S	1-hour	0.03 ppm (42 $\mu g/m^3$)	No federal standard	

Source: California Air Resources Board

Air Quality Table 3
San Luis Obispo County Attainment Status

Pollutant	Averaging Time	California Status	Federal Status
Ozone (O_3)	8 Hour	Non-attainment	Unclassified
	1 Hour	Non-attainment	N/A
Carbon Monoxide (CO)	8 Hour	Attainment	Attainment
Nitrogen Dioxide (NOx)	Annual	N/A	Attainment
	1 Hour	Attainment	N/A
Sulfur Dioxide (SO_2)	Annual	N/A	Attainment
	24 Hour	Attainment	Attainment
	1 Hour	Attainment	N/A
PM10	Annual	Non-attainment	N/A
	24 Hour	Non-attainment	Unclassified
PM2.5	Annual	Attainment	Attainment
	24 Hour	N/A	Attainment

Notes: N/A= no standard applies or not applicable
Source: California Air Resources Board

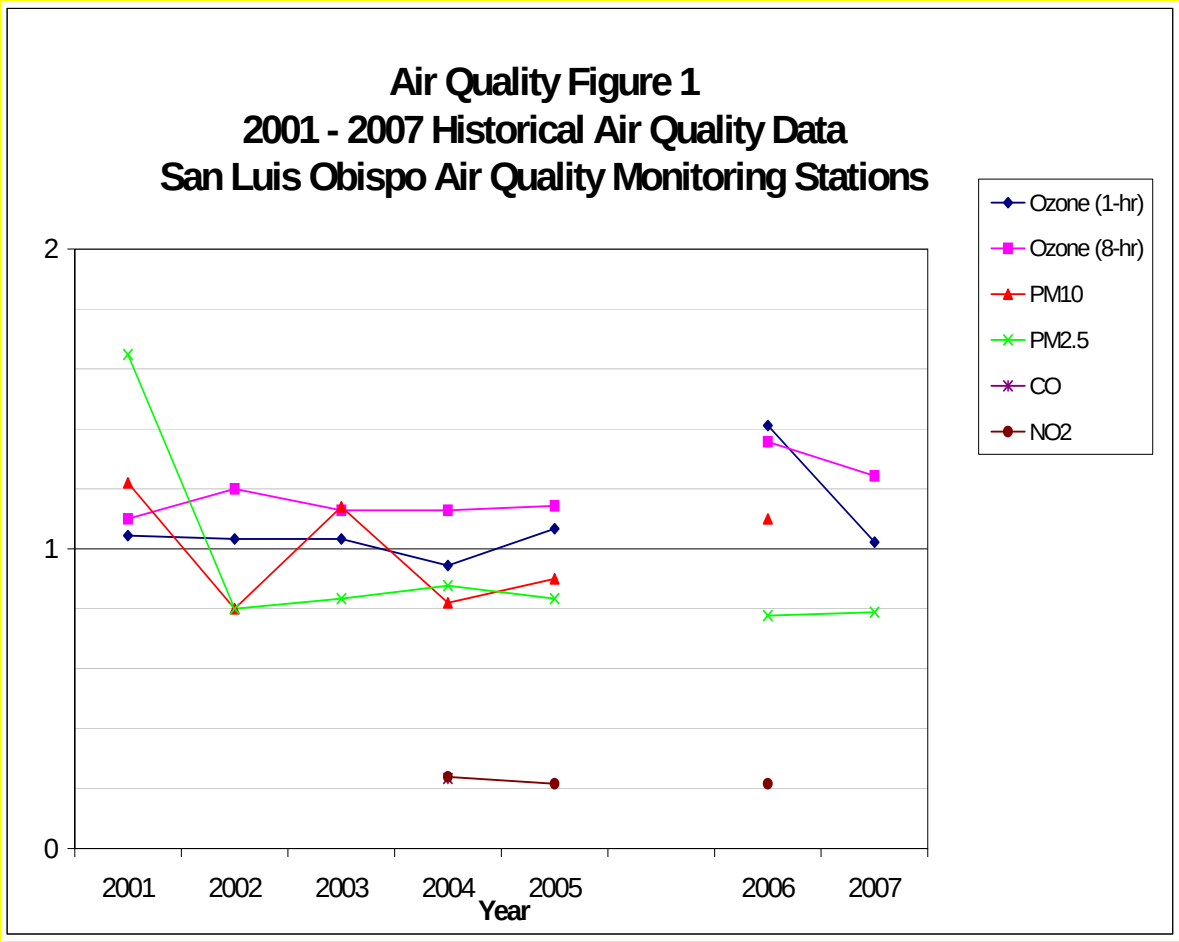
The project site is located in the South Central Coast Air Basin[2] and is under the jurisdiction of the San Luis Obispo County Air Pollution Control District. This area is designated as non-attainment for the state 24-hour and annual PM10[3] standard, non-attainment for the state (1-hour and 8-hour) ozone standards and unclassified for the federal 8-hour ozone standard, attainment for the state's and the federal PM2.5, CO, NO_2, SO_2, SO_4, and Pb standards. **Air Quality Table 3** summarizes the area's attainment status for various applicable state and federal standards. The ambient air quality standards that staff uses as a basis for determining project significance are health-based standards. They are set at levels to adequately protect the health of all members of the public, including those most sensitive to adverse air quality such as the aged, people with existing illnesses, and infants and children, while providing a margin of safety.

Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the year between 2001 through 2007 (the last year that the complete annual data is currently available) at the Atascadero and Carrizo Plain monitoring stations are shown in **Air Quality Figure 1**. In this figure, 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 (e.g., ozone and PM10) means that the measured concentrations of such air contaminant exceed the standard, and any

2 This air basin lies next to the Pacific Ocean, just north of the population giant South Coast air basin. Ventura, Santa Barbara, and San Luis Obispo counties are within its boundaries.

3 Particulate matter less than 10 microns in diameter

point that is less than one (e.g., CO, SO_2, and NO_2) means that the respective standard is not exceeded.



Notes:

1. 1-hour and 8-hour ozone data for the years 2001 to 2005 are collected at the Atascadero monitoring station.
2. 1-hour and 8-hour ozone data for the years 2006 to 2007 are collected at the Carrizo Plain monitoring station.
3. PM10 data for the year 2006 are collected at the Carrizo Plain station; all other PM10 data were collected at the Atascadero monitoring station.
4. All other data area collected at the Atascadero monitoring station.

Source: California Air Resources Board.

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 [VOC]) in the presence of sunlight to form ozone. It should be noted that the 1-hour and 8-hour ozone concentrations measured at the Carrizo Plain monitoring station is available for only two years - 2006 and 2007. The rest of the ozone concentrations were measured at the Atascadero monitoring station, which is approximately 40 miles north-east of the project site. The ozone concentrations measured at the Carrizo plain (see **Air Quality Figure 1**) show that the maximum 8-hour ozone concentrations are between 1.2 to 1.4 times the standard. For the rest of the air basin, the data show that violations of the state 1-

hour and 8-hour ambient air quality standards for ozone occurred regularly from 2001 to 2007.

Peak ozone levels and numbers of violations of the state 1-hour ozone standard have remained relatively stable since 2001 at the Atascadero monitor. The collected air quality data (not shown) indicate that the ozone violations occurred primarily during the sunny and hot periods typical during June through September.

The available air quality data shows that the ozone concentrations, both 1-hour and 8-hour, measured at the Carrizo Plain site are approximately 20 to 40 percent higher than those measured at the more industrial, more populated coast line. Staff notes that there is a significant lack of industrial and mobile activities in the Carrizo Plain and believes that the high ozone concentrations at the site result from ozone and ozone precursor being transported from adjacent upwind air basins.

The ARB report: "Ozone Transport: 2001 Review" (ARB 2001) confirms this with the following observations regarding ozone violations in the San Luis Obispo area:

- *San Luis Obispo County air quality is more closely linked with that of the San Francisco Bay Area and San Joaquin Valley. Air quality in Paso Robles is impacted by pollutants transported aloft from the San Francisco Bay Area and San Joaquin Valley. Transported pollutants can then mix with local emissions from Paso Robles and be blown south to cause violations at Atascadero.*
- *Ozone* violations *in San Luis Obispo County occur in the northern portion of the county, measured at monitors in the cities of Paso Robles and Atascadero.*

Nitrogen Dioxide

The entire air basin is classified as attainment for the state 1-hour NO_2 standard. The NO_2 levels in the area are no more than 25% of the most stringent NO_2 ambient air quality standard. 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 significant 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.

Carbon Monoxide

The area is classified as attainment for the state 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. As mentioned earlier, the area lack of industrial and mobile source activities make it unlikely that the CO air quality standard would be exceeded.

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 the state 24-hour and annual PM10 standards, and is unclassified for the federal 24-hour PM10. **Air Quality Figure 1** indicates that PM10 concentrations measured at Atascadero fluctuate around the state 24-hour PM10 standard. The only available set of PM10 data at the Carrizo Plain site, measured in 2006, shows that the state 24-hour PM10 standard was exceeded during one "six-day period[4]" with a measurement of 55 $\mu g/m^3$, which is about 10 percent higher than the state 24-hour standard. The rest of the year the measured PM10 concentrations are below the state 24-hour PM10 standard. Further assessment of the data indicated that the area experienced an unusual high wind day during the six-day period when the violation was measured, i.e., winds up to 17 miles per hour, which can cause excessive fugitive dust. Therefore, it could be that while the district is non-attainment of the PM10 standard, PM10 air quality may not be as poor on the Carrizo plain and may not be attributable to permitted emission sources.

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 South Central Coast Air Basin is classified as attainment for both the state and the federal PM2.5 air quality standards, but not in attainment of the state PM10 standard. This divergence indicates that the ambient particulate matter levels are most likely due to localized fugitive dust sources, such as vehicles travel on unpaved roads, agricultural operations, or wind-blown dust.

PROJECT DESCRIPTION

The proposed project site is approximately 640 acres, and consists of 195 compact linear fresnel reflector (CLFR) solar concentrating lines, associated steam drums, steam turbine generators (STGs), air-cooled condensers (ACCs), and infrastructure, producing up to a nominal 177 megawatts (MW) net. The solar field would operate daily from sunrise to sunset. Typical operating hours for the CESF would be approximately 13 hours per day, or an average of 4,765 hours per year. The project includes a diesel-fired 300-horsepower fire pump engine.

Construction of the proposed project would require an additional 380-acre construction lay down area located directly south of the project site and across SR-58. If the license to construct is approved, construction of the CESF, from site preparation and grading to full commercial operation, is expected to take approximately 35 months.

4 PM10 data are collected and measured once every sixth day, thus it is assumed that the entire six days are exceeding the standard.

The CESF is located in an area zoned for agricultural uses as specified in the San Luis Obispo County General Land Use Plan, and electrical generation is listed in the San Luis Obispo County Land Use Ordinance as an allowed use within the agricultural zone. Existing and past land uses include transmission lines, the PG&E Carrizo Plain Substation, agricultural, rural residences, and the prior Atlantic Richfield Company (ARCO) Carrisa Plain Solar Project (adjacent to the Project site).

INITIAL COMMISSIONING AND CLOSURE

Initial commissioning refers to a period prior to beginning commercial operation when the equipment undergo initial tests. Because of this project's use of a relatively new technology, the commissioning period is uncertain, however, staff does not expect significant changes in of emissions from the facility commissioning activities compared to that of full production.

Eventually the facility would close, either as a result of the end of its useful life or through 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 all impacts associated with those emissions would no longer occur. The only other expected emissions would be equipment and vehicle emissions and fugitive particulate emissions from the dismantling activities. These activities would be of much a shorter duration than construction of the project.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The criteria that staff uses to determine whether project emissions would be significant are based upon the extensive federal and state regulatory programs designed to protect against adverse effects from air contaminants. The first is the status of the ambient air quality standards in the area. If the area is non-attainment for a certain air quality standard, it is most likely that the project's emissions of that air contaminant and its precursors would contribute to existing, or ongoing, violations of that standard. For example, the area is currently non-attainment for the state ozone standards; therefore, all ozone precursors (NOx, and VOC) that the facility releases during construction and operational, including on-site vehicular emissions, would potentially cause significant impacts through their contribution to the existing violations of the standards.

The second criterion is whether the project's construction and operational emissions would cause a new violation to the ambient air quality standards. Staff relies on air dispersion modeling to conduct this assessment. Air dispersion models predict the location and ground level magnitude of the impacts of a new emissions source. In general, the inputs for the modeling include stack information (exhaust flow rate, temperature, and stack dimensions), specific source (e.g., fire pump engine) air pollutant emissions data, meteorological data, such as wind speed, atmospheric conditions, and site elevation. The model results are often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$). Staff adds the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations. Staff compares the results

with the ambient air quality standards for each respective air contaminant to determine whether the project's air pollutant emission would cause a new violation of the ambient air quality standards or if the emissions would contribute to an existing violation. Staff and the applicant did not model the direct impacts associated with the operational vehicle emissions.

DIRECT/SECONDARY IMPACTS AND MITIGATION

Staff assessed three kinds of primary and secondary[5] impacts: construction, operational, and cumulative. Construction impacts result from the emissions occurring during site preparation and construction of the project. Operational impacts result from the emissions of the proposed project during normal operation, which include the fire pump engine testing and maintenance vehicle emissions. Cumulative impacts result from the proposed project's incremental effect, together with other closely related past, present and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065(c), 15130, and15355.)

Construction Impacts

The construction of the proposed project would last approximately 35 months (CESF2007a), and generally consists of two major activities; site preparation, and construction and installation of major equipment and structures. In addition to fugitive dust emissions resulting from the site preparation, emissions from construction equipment exhausts such as vehicles and internal combustion engines are also expected during the project construction phase. Also, a small amount of hydrocarbon emissions may occur as a result of the temporary storage of petroleum fuel at the site.

Using estimated peak hourly, daily and annual construction equipment exhaust emissions, the applicant modeled construction emissions to determine impacts. The results are presented in **Air Quality Table 4**. The construction modeling analysis includes both the fugitive dust and vehicle exhaust emissions, which include PM10, NOx, and CO. In **Air Quality Table 4**, the first and second columns list the air contaminant, i.e., NO_2, PM10, and CO, and the averaging time for each air contaminant analyzed. The third column presents the project emission impacts, and the fourth column presents the highest measured concentration of the criteria air contaminants in the ambient air (background). The fifth column presents the total impact, i.e., the sum of project emission impact and background measured concentration.

Air Quality Table 4
Maximum Project Construction Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [1] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr.	149	105	254	338	75%
CO	8-hr.	25.7	1,367	1,393	10,000	14%

5 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.

PM10	24-hr.	9.4	55	64.4	50	**129%**

1. Background measurements are measured at the nearest monitoring stations to provide the most representative ambient air quality.

Source: AFC, Table 5.2-15 (CESF2007a).

Staff notes that the local measurements of PM10 may be skewed by wind-blown dust. However, other measurements indicate that PM10 levels in the air basin are often above the standards. Therefore, staff reviewed the modeling and finds that construction of the facility would likely result in significant, unavoidable short-term PM10 impacts.

Construction Impacts Mitigation

To mitigate the impacts due to construction of the facility, the applicant has proposed the following mitigation measures (CESF2007a):

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

B. Vehicle speeds would be limited to 5 miles per hour within the construction site.

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

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

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

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

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

H. At least the first 500 feet of any paved public roadway exiting from the construction site would be swept regularly on days when construction activity occurs.

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

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

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

L. Shut down of construction equipment to avoid excessive idling emissions.

M. Use of low sulfur, low aromatic diesel fuel for construction equipment.

N. Maintain construction equipment in top service shape.

O. Use construction equipment that meets state and federal emission standards for Tier II and Tier III.

Despite the uncertainty about actual PM10 levels on the Carrizo Plain compared to the rest of the air district, the construction of the project would contribute particulate matter emissions that could add to the existing potential violations of the ambient PM10 air quality standards. Therefore, staff believes the project PM10 emission impacts due to construction of the project are significant. Staff believes that the implementation of proposed specific mitigation measures, often considered best practices[6], during construction of the facility, identified in Conditions of Certification **AQ-SC1** to **AQ-SC5**, would substantially eliminate the potential PM10 construction impacts to a level of less than significant. And for these conditions to be effective, it is critical that construction activities and condition compliance be monitored by an on-site air quality construction mitigation manager as specified in **AQ-SC1.** These conditions include all of the applicant's proposed mitigation measures and staff suggested modifications.

Operational Emissions and Impacts

During the operation phase of the project, the facility's emissions are mainly generated by motor vehicles that are used in the mirror cleaning and undesirable vegetation removal, and the weekly testing of the emergency firewater pump. There are twelve (12) gasoline-powered trucks, equivalent to a Ford F150 model used to clean the mirrors and control on-site vegetation. In addition there are ten (10) gasoline-powered all-terrain vehicles used for personnel transport in support of general maintenance, mirror cleaning and vegetation control work. The facility and equipment emissions, including fugitive PM10 emissions, are estimated and summarized in **Air Quality Table 5**.

The applicant has provided a modeling analysis using the EPA-approved AERMOD model to estimate the impacts of the project's non-vehicular NOx, PM10, CO, and SOx emissions resulting from project operation (CESF2007b). Similar to the assessment of construction impacts, staff added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations to assess the project operational impacts.

Staff tabulated the modeling analysis in **Air Quality Table 6**. The data show that the project does not cause any new violations of NO_2, PM2.5, CO or SO_2 air quality standards, even using the worst case ambient concentrations recorded. The applicant and staff did not model the operational, on-site vehicle emissions. However, the operational, on-site vehicle emissions are similar in emissions release patterns and type to construction emissions. Since the construction emissions, which are significantly higher on a daily basis, did not show significant impacts, except for potentially PM10, staff believes that the operational, on-site vehicle emissions will not cause a direct impact. Again, staff notes that the local measurements of PM10 may be skewed by

6 Best Practice is generally defined as a technique, method, process, or activity that is more effective at delivering a particular outcome than any other technique, method, process, etc.

wind-blown dust. However, other air quality measurements indicate that PM10 levels in the air basin are often above the standards. Therefore, the project emissions would likely contribute to existing violations of the state 24-hour PM10 air quality standards.

Air Quality Table 5
Facility's Maximum Daily and Annual Operating Emissions

Equipment	NOx	VOC	SOx	CO	PM10
Maximum Daily Emissions (lbs/day) [3]					
All terrain vehicles	0.06	6.21	0.035	11.31	0.024
Trucks for mirror cleaning equipment [1]	0.081	0.193	0.003	1.88	0.005
Maintenance trucks [1]	0.081	0.193	0.003	1.88	0.005
Worker's vehicles	0.008	0.008	.0001	0.081	0.001
Fugitive PM10 [2]					2.94
Total Daily Emissions (lbs/day)	**0.23**	**6.60**	**0.04**	**15.15**	**2.98**
Maximum Annual (tons/year)					
All maintenance activities	0.042	1.204	0.007	2.766	5.42
Emergency fire pump [3]	0.02	Neg	Neg	0.001	Neg
Emergency diesel generator [3]	0.11	Neg	Neg	0.004	Neg
Total Annual Emissions (tons/year)	**0.062**	**1.205**	**0.007**	**2.767**	**5.42**

Notes:
1. Emissions of gasoline powered Ford F150 trucks operating approximately 10 miles a day.
2. Fugitive emissions of vehicles traveled on watered or chemical treated unpaved roads at 5mile per hour limit.
3. Emissions from emergency fire pump and emergency generator engines estimated using 30 hours of testing per year. Daily emissions from testing are negligible and not shown here.

Source: AFC Table 5.2-12, 2/26/08 Data Response (CESF2008a), and AFC Supplement (CESF2008h)

Air Quality Table 6
Project Operation Emission Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$) [4]	Total Impacts ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hour	138.3	105.3	243.6	338[1]	69%
	Annual	0.02	17	17.02	56[1]	30%
SO_2	1-hour	0.154	309	309	655 [1]	47%
	24-hour	0.002	52.5	52.5	105 [1]	50%
CO	1-hour	11.2	2,415	2,426	23,000 [1]	11%
	8-hour	0.080	1,367	1,367	10,000 [1]	14%
PM10	24-hour	0.037	55	55	50 [1]	**110%**
	Annual	0.001	18	18	20 [1]	90%
PM2.5	24-hour	0.037	30.7	30.8	35 [2]	88%
	Annual	0.001	8.3	8.3	12 [1]	69%

Notes
1. State standards
2. Federal standards
3. Including impacts from emergency and fire pump engines.
4. Background measurements are measured at the nearest monitoring stations to provide the most representative ambient air quality levels.

Source: AFC Air Quality Modeling Analysis (CESF2007b).

Staff Discussion of Project's Impacts on Ozone Air Quality Standard

As discussed in the **SETTING** section of this analysis, there are meteorological circumstances where ozone and ozone precursor (NOx and VOC) emissions from the San Joaquin Valley and San Francisco Bay Area, mixed with the localized emissions from Paso Robles, cause and contribute to ozone violations in the District. Staff does not believe that the ozone violations measured at the project site are caused by localized NOx and VOC emissions due to a lack of local industrial and mobile activities and emission sources. However, staff remains concerned that local air quality would continue to be adversely affected by upwind areas that have large populations and vehicle fleets, and contain numerous emissions sources, ensuring their continued emission contributions to the area's unhealthy air quality.

The project would add close to 7 lbs per day of NOx and VOC (ozone precursors) to the (CESF2008h), dominated by emissions from the all-terrain vehicles, to the ambient air. It may be that the local air quality is above ozone standards due to transport from upwind districts, but the ambient air is still non-attainment. Staff believes that the project's daily NO_2 emissions from the testing of the emergency generator and the fire pump engines will be negligible because these engines are tested one at a time for 30 minutes each week (as required), and that the impacts were estimated assuming that the engine is continuously operated. Thus during probable daily operation [when the engines are not being tested], the facility direct NO_2 and VOC emissions will be predominately from the all-terrain vehicles.

It should also be noted that the project site was previously zoned and operated as agricultural operation, thus staff believes that the emissions emitted at the site before and after construction of the facility may not be that much different. However, staff believes that the project emissions impacts on ozone air quality standards are likely significant.

Staff Discussions of Project's Impacts on PM10 Air Quality Standard

PM10 air quality violations in the area can be caused by both transport and local sources. It should be noted that, because the area is in attainment for the PM2.5 standard, staff believes that the PM10 violations are caused by local, and most likely fugitive dust emissions[7].

As mentioned earlier, the project site was previously zoned and operated as agricultural operation; thus staff believes that the fugitive dust and PM10 emissions emitted at the site before and after construction of the facility may not significantly differ.

The project would add almost three pounds of PM10 per day, or 0.037 μg/m3 impact (CESF2008h) to the relatively pristine area, which only have one exceedance of the state 24-hour standard for the year (see **SETTING** section). The PM10 concentration exceedance at the project site can be caused by the unusual high wind day. According

7 Because PM2.5 is a subset of PM10, and that PM2.5 is much smaller and lighter than PM10, it can travel farther and suspend longer in the atmosphere; therefore, the absence of PM2.5 exceedances while PM10 air quality standard is exceeded can be viewed as an indication of PM10 exceedances are caused by local emissions.

to the criteria used by the California Air Resources Board[8], this unusual measurement may be excluded from the data used to determine whether an area is attainment or non-attainment. If the high measurement of 55 $\mu g/m^3$ is excluded from the attainment determination, the project site area can be considered as "equivalent to" getting a PM10 attainment status. Addition of 0.037 $\mu g/m^3$ PM10 impact to the project site area would not cause a new violation of the standard, per the air dispersion modeling.

However, staff believes that the project direct and fugitive emissions impacts on PM10 air quality standards are likely significant.

Operational Impacts Mitigation

The applicant proposes to mitigate the project's potential contributions to the ambient ozone and PM10 by using Air Resources Board (ARB) certified engines that meets the US EPA Tier II emission standards for the emergency generator and the fire pump engines. In addition, the facility would employ gasoline engine trucks and two-stroke and four-stroke[9] all-terrain vehicles to provide necessary project maintenance, and watering or chemical treating of all the facilities maintenance roadways.

As mentioned earlier in the discussions of the ozone and PM10 impacts, staff believes that the project's ozone precursors and PM10 emissions are minimal, but would likely be significant. Additionally, staff believes a solar renewable projects, which would have a 30 to 40-year life in a setting likely to continue to be impacted by both local and upwind emission sources, should address it contribution to a potentially ongoing non-attainment of the PM10 and ozone standards. Therefore, staff recommends the following additional mitigation measures:

- Use of electric [battery] powered vehicles, similar to those use in the golf course, to transport maintenance crew within the facility, thereby eliminating almost all the ozone precursor emissions during operation;
- Use of electric [battery] powered vehicles, similar to those use in the golf course, to transport maintenance crew within the facility, thereby eliminating knobby, off-road tires that could disturb stabilized soil and roads:
- Wind erosion control techniques such as windbreaks, water, and chemical dust suppressants, should be used on areas that could be disturbed by vehicles or wind. Any windbreaks used would remain in place until the soil or road is stabilized: and,
- Limit vehicle speeds within the facility to no more than 5 miles per hour to address fugitive PM emissions from the site.

8 California Air Resources Board "2006 Area Designations and Maps: Initial Statement of Reasons for Proposed Rule Making" September 26, 2006.

9 "Two-stroke" engines operate by producing a power stroke of the piston from every revolution of the crankshaft. Thus, it requires lubrication oil mixed in with gasoline fuel prior to combustion. Four-stroke engines are those that operate with four specific stokes of the piston: intake, compression, combustion, and exhaust. Thus it produces a power stroke on every other crankshaft revolution and does not combust the lubricating oil.

Staff recommendations are specified in conditions of certification **AQ-SC6** and **AQ-SC-7**.

Cumulative Impacts and Mitigation

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 analysis is concerned with criteria air pollutants. Such pollutants have impacts that are usually (though not always) cumulative by nature. Rarely would a project 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.

The applicant, in consultation with the District, has conducted a survey of stationary sources that have potential for emissions of criteria air contaminants within six miles of the project site that are either under construction, or have received permits to be built or operate in the foreseeable future. The survey results indicate that no such sources exist within the six miles radius[10] of the proposed project site. Therefore, no additional cumulative air quality impact modeling analysis was performed, and no significant cumulative impacts are expected.

CONCLUSIONS

- The project would comply with applicable District Rules and Regulations, including New Source Review requirements.
- The project's construction activities would likely contribute to significant adverse PM10 impacts. Staff recommends **AQ-SC1** to **AQ-SC5** to mitigate the potential impacts.
- The project would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards, and therefore, the project direct operational NOx, SOx, PM2.5 and CO emission impacts are not significant.

10 Staff assumes that impacts from projects beyond six miles would not affect the modeling analysis on a cumulative basis.

- The project's direct and indirect, or secondary emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely significant. Therefore, staff recommends the use of gasoline-fueled light trucks to pull the water tanks (for washing of mirrors), the use of electric-powered vehicles, soil stabilizers for the mirror areas and roads, and on-site speed limits (**AQ-SC6** and **AQ-SC7**) to ensure that the potential ozone and PM10 impacts are mitigated to less than significant over the life of the project.
- The project would comply with the requirements of SB 1368 and the Emission Performance Standard for greenhouse gases.

PROPOSED 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 **AQ-SC3**, **AQ-SC4 and AQ-SC5** for the entire project site and linear facility construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

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

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with **AQ-SC3**, **AQ-SC4, AQ-SC5** and **AQ-SC6**.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM for approval. The District will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt.

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

A. All unpaved roads and disturbed areas in the project and linear construction sites shall be watered as frequently as necessary to comply with the dust mitigation objectives of **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

B. No vehicle shall exceed 5 miles per hour within the construction site.

C. The construction site entrances shall be posted with visible speed limit signs.

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

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

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

G. 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 District.

H. Construction areas adjacent to any paved roadway shall be provided with sandbags or other measures as specified in the Storm Water Pollution Prevention Plan (SWPPP) to prevent run-off to roadways.

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

J. At least the first 500 feet of any public roadway exiting from the construction site shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff from the construction site is visible on the public roadways.

K. 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.

L. 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.

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

Verification: The AQCMM shall provide the CPM a MCR to include:

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

2. Copies of any complaints filed with the District in relation to project construction; and

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

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (1) off the project site or (2) 200 feet beyond the centerline of the construction of linear facilities or (3) within 100 feet upwind of any regularly occupied structures not owned by the project owner indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

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

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

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the District any directive from the AQCMM or Delegate to shut down an activity, provided that the shutdown shall go into effect within one hour of the original determination, unless overruled by the District before that time.

Verification: The AQCMM shall provide the CPM a MCR to include:

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

2. Copies of any complaints filed with the District in relation to project construction; and

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

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM in the MCR, a construction mitigation report that demonstrates compliance with the following mitigation measures for the purposes of controlling diesel

construction-related emissions. Any deviation from the following mitigation measures shall require prior CPM notification and approval.

A. All diesel-fueled engines used in the construction of the facility shall be fueled only with ultra-low sulfur diesel, which contains no more than 15 ppm sulfur.

B. 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.

C. All construction diesel engines, which have a rating of 100 hp or more, shall meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, section 2423(b)(1) unless certified by the on-site AQCMM that such engine is not available for a particular item of equipment. In the event a Tier 2 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a Tier 1 engine. In the event a Tier 1 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a catalyzed diesel particulate filter (soot filter), 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” if, among other reasons:

   1. There is no available soot filter that has been certified by either the California Air Resources Board (ARB) or U.S. Environmental Protection Agency (EPA) for the engine in question; or

   2. The construction equipment is intended to be on-site for ten (10) days or less.

   3. The CPM may grant relief from this requirement if the AQCMM can demonstrate that they have made a good faith effort to comply with this requirement and that compliance is not possible.

D. The use of a soot filter may be terminated immediately if one of the following conditions exists, provided that the CPM is informed within ten (10) working days of the termination:

   1. The use of the soot filter is excessively reducing normal availability of the construction equipment due to increased downtime for maintenance, and/or reduced power output due to an excessive increase in backpressure.

   2. The soot filter is causing or is reasonably expected to cause significant engine damage.

   3. The soot filter is causing or is reasonably expected to cause a significant risk to workers or the public.

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

E. All heavy earthmoving equipment and heavy duty construction related trucks with engines meeting the requirements of (c) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

F. All diesel heavy construction equipment shall not remain running at idle for more than five minutes, to the extent practical.

Verification: The AQCMM shall include in the MCR:

1. A summary of all actions taken to maintain compliance with this condition,

2. 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

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

AQ-SC6 The project owner shall use gasoline powered light trucks, equivalent to a FORD F150 model, for mirror washing activities and facility maintenances. In addition, only electric-powered vehicles shall be used to support maintenance crew within the facility.

Verification: At least 60 days prior to start commercial production, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site electric and fossil-fueled 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 dust control plan that:

- Describes the wind erosion control techniques such as windbreaks, water, and chemical dust suppressants that shall be used on areas that could be disturbed by vehicles or wind; and
- 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 5 miles per hour on these unpaved roadways.

Verification: At least 60 days prior to start of commercial operation, the project owner shall submit to the CPM a copy of the plan that identifies the dust and erosion control procedures that will be used during operation of the project and that identifies all locations of the speed limit signs. At least 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) 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. 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 any proposed air permit modification to the CPM within five 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.

DISTRICT CONDITIONS

AQ-1. The Air Pollution Control Officer (APCO) shall be notified in writing no later than three (3) business days prior to initial operation of this equipment. This Authority to Construct shall then serve as a temporary Permit to Operate for a period not to exceed three (3) months from the start-up date. The APCO shall be notified if the start-up is delayed.

Verification: No verification needed.

AQ-2. Non-Emergency Operation

a. Non-emergency operation of the fire pump engine shall not exceed the number of hours necessary to comply with the testing requirements of National Fire Protection Association (NFPA) 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems (the number of necessary hours is nominally 30 hours per year). Proof of operating requirements for the fire pump engine shall be maintained onsite.

b. Non-emergency operation of the generator engine shall be limited to maintenance and performance testing only and shall not exceed thirty (30) hours per engine per calendar year. Operation for emissions testing required by the District shall not be limited by this condition.

c. The Air Pollution Control Officer (APCO) shall be notified in writing within seven (7) days of exceeding the yearly non-emergency operation limit.

d. An emergency is defined as a fire that requires the use of the fire suppression system, or failure of normal electrical power service that is beyond the control of the permit holder and does not include voluntarily disconnecting from utility grid power.

Verification: The project owner shall maintain accurate record of the time and duration of operating the engine and generator, and shall make the record available to the District and the CPM upon request.

AQ-3. Only diesel fuel that meets the California Air Resources Board's specifications for on-road use shall be used to fuel the engine(s) unless otherwise approved by the APCO. Records of the fuel purchases shall be maintained and include a fuel specification sheet that shows compliance with this condition.

Verification: No verification needed.

AQ-4. Visible emissions from the engine shall not exceed Ringlemann No. ½ or ten percent (10%) opacity for periods aggregating more than three (3) minutes in any hour.

Verification: No verification needed.

AQ-5. A non-resettable hour meter for each engine shall be installed and maintained unless an APCO approved alternative tracking procedure is approved.

Verification: At least thirty (30) days prior to installation of the fire pump engine and emergency generator, the project owner shall provide the District and the CPM, for approval, copies of the engine names, manufacturers, the equipment and stack drawings, and the specifications of the operating hour meters.

AQ-6. The engine exhaust shall discharge vertically free of obstructions.

Verification: At least thirty (30) days prior to installation of the fire pump engine and emergency generator, the project owner shall provide the District and the CPM, for approval, copies of the engine names, manufacturers, the equipment and stack drawings, and the specifications of the operating hour meters.

AQ-7. An operating log for the current calendar year shall be maintained for each engine on a monthly basis. Entries shall also be made for any day that the engine is operated and for any day that the engine receives fuel. The logs shall be retained for at least three (3) years and shall include the following data:

a. Operating mode: emergency, maintenance, or District required testing

b. Engine hour meter reading at start-up,

c. Engine hour reading at shutdown,

d. Operating hours for the calendar day,

e. Running total calendar year to date operating hours,

f. Running total calendar year to date operating hours in maintenance mode,

g. Running total calendar year to date operating hours in emergency mode,

h. Estimated fuel use for the day in gallons,

i. Running total calendar year to date fuel use in gallons,

j. Fuel purchased in gallons, and

k. Total costs of any engine repair or reconstruction, excluding consumable items associated with standard maintenance activities.

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

AQ-8. Within fourteen (14) days of a request, the following information shall be submitted to the APCO for the previous calendar year:

a. maintenance operating hours,

b. emergency operating hours,

c. District required testing operating hours,

d. total engine operating hours,

e. total fuel usage,

f. copies of all fuel purchase records, and

g. total cost of engine repairs to date for each engine.

Verification: No verification needed.

AQ-9. The APCO shall be notified prior to the repair or reconstruction of any diesel engine under permit. Consumable items used for regular maintenance, such as filters, hoses, belts, fluids, and glow plugs, are not considered repairs. In addition, replacement parts costing less than $100.00 can be omitted from this requirement. This condition is a result of a state regulation on rebuilds or repairs. Extensive repairs could trigger lower allowable emission rates. If lower emission rates apply, they may not be achievable with a simple rebuild.

Verification: No verification needed.

AQ-10. This equipment shall be operated and maintained in accordance with the manufacturer's recommendations and the information presented in the application under which this permit was issued.

Verification: No verification needed.

AQ-11. If the APCO determines that the operation of this equipment is causing a public nuisance, the owner/operator shall take immediate action and eliminate the nuisance.

Verification: No verification needed.

AQ-12. The APCO shall be notified in writing before any changes are made to operating procedures, equipment, or materials used which have the potential to increase the emission of any air contaminant.

Verification: No verification needed.

AQ-13. This permit is not transferable to a new owner or location without the APCO's approval. A change of ownership application shall be submitted to the APCO at least ten (10) working days prior to any change in the person or agency that is responsible for the operation of the equipment described above. An authority to construct application must be submitted and approved by the APCO prior to moving the permitted equipment to a new location.

Verification: No verification needed.

REFERENCES

CEC2007d – CEC/M. Dyas (tn: 43461) Data Adequacy Recommendation Package. Dated 11/20/2007. Submitted to CEC/Dockets on 11/21/2007.

CEC2008d - CEC/M. Dyas (tn: 45144) Data Requests 1-78. Dated 1/28/2008. Submitted to CEC/ Docket Unit on 1/28/2008.

CESF2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

CESF2007b – Carrizo, LLC/P. Fontana (tn: 43008) AFC – Air and HARP Modeling Files on CD. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

CESF2007c – Carrizo, LLC/P. Fontana (tn: 43161) Standby Diesel Engine Permit Application filed with San Luis Obispo County Air Pollution Control District. Dated 10/26/2007. Submitted to M Dyas/Dockets on 11/01/2007.

CESF2007d – Carrizo, LLC/A. Lieba URS (tn: 43752) Submittal of Supplemental Information Responses to Data Adequacy Requests. Dated 12/14/2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 12/17/2007.

CESF2008a – Carrizo, LLC/A. Lieba URS (tn: 45465) Responses to Data Requests 1-78. Dated 2/26/2008. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 2/27/2008.

CESF2008h – Carrizo, LLC/A. Lieba URS (tn: 46925) AFC Supplement. Dated 7/03/2008. Submitted to CEC/Melissa Jones/Dockets on 7/03/2008.

SLOC2007a – SLO County Air Pollution Control District/B. Aunger (tn: 43364) Notification of Complete Application for an Authority to Construct. Dated 11/14/2007. Submitted to M Dyas/Dockets on 11/15/2007.

SLOC2007b – SLO County Air Pollution Control District/A. Bugrov (tn: 43515) APCD Comments on CESF AFC. Dated 11/28/2007. Submitted to M Dyas/Dockets on 11/29/2007.

APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Matthew Layton, P.E.

SUMMARY OF CONCLUSIONS

The Carrizo Energy Solar Farms Project (CESF) is a solar project that 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 California specific, electricity system GHG emission rate average. Moreover, even if it were a higher GHG emitting power plant, it would be speculative to conclude that the project would result in a cumulatively significant GHG impact. Staff recommends reporting of the GHG emissions as the California Air Resources Board develops greenhouse gas regulations and/or trading markets required by the California Global Warming Solutions Act of 2006 (AB 32 Núñez, Chapter 488, Statutes of 2006). The project may be subject to additional reporting requirements and GHG reductions or trading requirements as these regulations become more fully developed and implemented.

Staff concludes that the short-term emission of greenhouse gases during construction would be sufficiently reduced and would, therefore, not be significant.

The Carrizo Energy Solar Farm Project, as a solar project with a nightly shutdown would operate less than 60 percent of capacity and is therefore not subject to the requirements of SB 1368 (Perata, Chapter 598, Statutes of 2006) and the Greenhouse Gas Emission Performance Standard. However, the Carrizo Energy Solar Farms Project would easily comply with the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

INTRODUCTION

Greenhouse gas (GHG) emissions are not criteria pollutants, but they are discussed in the context of cumulative impacts. The state has demonstrated a clear willingness to address global climate change though 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.

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 project's compliance with these requirements.

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

Applicable Law	Description
State	
AB 32 Núñez, Chapter 488, Statutes of 2006	California Global Warming Solutions Act of 2006. This act requires ARB to enact standards that will reduce GHG emission to 1990 levels. Electricity production facilities will be regulated.
SB 1368 Perata, Chapter 598, Statutes of 2006	Greenhouse Gas Emission Performance Standard. This regulation prohibits 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 mt CO_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[11] 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 reductions to be achieved by 2020.[12] To achieve this, ARB has a mandate to define the 1990 emissions levels 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 plans to establish statewide emissions caps, by economic sectors, in 2008. By January 1, 2009, ARB will adopt a scoping plan that will identify how emission reductions will be achieved from significant sources of GHG via regulations, market mechanisms, and other actions. ARB staff will then draft regulatory language to implement its plan and will hold additional public workshops on each measure, including

11 Global climate change is the result of greenhouse gases, or emissions with global warming potentials, affecting the energy balance, and thereby, climate of the planet. The term greenhouse gases (GHG) and global climate change (GCC) gases are used interchangeably.

12 Governor Schwarzenegger has also issued Executive Order S-3-05 establishing a goal of 80 percent below 1990 levels by 2050.

market mechanisms (ARB 2006). The regulations must be effective by January 1, 2011 and mandatory compliance commences on January 1, 2012.

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 are identified in the California Climate Action Team's Report to the Governor (CalEPA 2006). Others are being established by ARB during its 2008 scoping plan development process. Some strategies focus on reducing consumption of petroleum across all areas of the California economy. Improvements in transportation energy efficiency (fuel economy) and land use planning and alternatives to petroleum-based fuels are slated to provide substantial reductions by 2020 (CalEPA 2006). It is possible that GHG reductions mandated by ARB will be non-uniform or disproportional across emitting sectors, in that most reductions will be based on cost-effectiveness (i.e., the greatest effect for the least cost). For example, the ARB proposes a 40 percent reduction in GHG from the electricity sector, even though that sector currently only produces about 25 percent of the state 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 addresses climate change within the electricity, natural gas, and transportation sectors. For the electricity sector, it recommends such approaches as pursuing all cost-effective energy efficiency measures and meeting the Governor's stated goal of a 33 percent renewable portfolio standard.

SB 1368[13], also 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[14] (1,100 pounds CO_2/MWh). Specifically, the Emission Performance Standard (EPS) applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California.[15] If a project, instate or out of state, plans to sell base load electricity to California utilities, the utilities will have to demonstrate that the project complies with the EPS. *Base load* units are defined as units that operate at a capacity factor higher than 60 percent of the year. As a project operating less than 60 percent per year, CESF is not required to comply 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

13 Public Utilities Code § 8340 et seq.

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

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

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.

Project Greenhouse Gas Emissions

The generation of electricity using fossil fuels, even in a back-up generator at a thermal solar plant, can produce 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. For fossil fuel-fired power plants and equipment, these 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). Also included are 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 the carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused/recycled, but are nevertheless documented here as some of the compounds have very large relative 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 plant. Mass emissions of GHG are converted into carbon dioxide equivalent (CO_2-equivalnet) metric tonnes for ease of comparison.

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. **Greenhouse Gas Table 2** shows what the proposed project, as permitted, could potentially emit in greenhouse gases during a worst-case year of construction. The construction is expected to last almost 36 months. All emissions are converted to CO_2-equivalent and totaled.

Greenhouse Gas Table 2
CESF Estimated Potential Construction Greenhouse Gas Emissions

Construction Element	CO_2 Equivalent (metric tonnes/year) [a]
On-Site Construction Equipment	1637
On-Site Worker Vehicles	100
Off-Site Worker Commute	5092
Construction Total	6829

Source: Staff estimate based on construction data provided by the applicant (CESF2008i).
[a] One metric tonne (mt) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms

Operations

Operation of the proposed CESF project would cause GHG emissions from the facility maintenance fleet, diesel-fueled fire pump and the back-up generator engines, and sulfur hexafluoride emissions from new electrical component equipment.

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 dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are small and also are more likely to be easily controlled or reused/recycled, but are nevertheless documented here as some of the compounds have very large relative global warming potentials.

Greenhouse Gas Table 3
Staff Estimated CESF Potential Operating Greenhouse Gas Emissions

	CO_2-equivalent (metric tonnes [a] per year)
Emergency Engine	7.5
Fire Pump Engine	1.7
Maintenance Vehicles	73.8
Worker Vehicles [b]	591
Equipment Leakage	271.8
Total – mt CO_2–eq per year	**945.8**
Facility MWh per year [c]	375,000
Facility GHG Performance (mt CO_2-equivalent per MW)	0.003

Sources: CESF2008i.
[a]One metric tonne (mt) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
[b] Assume 42 workers commuting 40 miles round trip each day.
[c] CESF 2007a, page 3-39.

The proposed project would be permitted, on an annual basis, to emit over 945 metric tonnes of CO_2-equivalent per year if operated at its maximum permitted level. Since Carrizo Energy Solar Farm Project, as a solar project with a nightly shutdown will operate less than 60 percent of capacity, the project is not subject to the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard. However, the Carrizo Energy Solar Farms Project, at 0.003 mt CO_2-equivalent/MWh, would easily comply with the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard of 0.500 mt CO_2/MWh.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses three kinds of impacts: construction, operation, and cumulative effects. As the name implies, construction impacts result from the emissions occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation. Cumulative impacts analysis assesses the impacts that result from the proposed project's incremental effect viewed over time.

CONSTRUCTION IMPACTS

Staff does not believe that the small GHG emission increases from construction activities would be significant for several reasons. First, the period of construction will be short-term and the emissions intermittent during that period, not ongoing during the life of the project. Additionally, control measures that staff recommends, such as limiting

idling times and requiring, as appropriate, equipment that meet the latest emissions standards would further minimize greenhouse gas emissions since staff believes that the use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment.

DIRECT/INDIRECT OPERATION IMPACTS AND MITIGATION

The proposed CESF promotes the state's efforts to improve GHG electrical generation efficiencies and, therefore, reduce the amount of natural gas used by electricity generation and greenhouse gas emissions. As the *2007 Integrated Energy Policy* Report (CEC 2007a, p. 184) noted:

> New natural gas-fueled electricity generation technologies offer efficiency, environmental, and other benefits to California, specifically by reducing the amount of natural gas used—and with less natural gas burned, fewer greenhouse gas emissions. Older combustion and steam turbines use outdated technology that makes them less fuel- and cost-efficient than newer, cleaner plants.… The 2003 and 2005 IEPRs noted that the state could help reduce natural gas consumption for electric generation by taking steps to retire older, less efficient natural gas power plants and replace or repower them with new, more efficient power plants.

Thus, in the context of the Energy Commission's *Integrated Energy Policy Report*, the CESF - solar-powered, no natural gas use, limited GHG emissions and likely replacement of older existing plant capacity, furthers the state's strategy to promote generation system efficiency and reduce fuel use and GHG emissions.

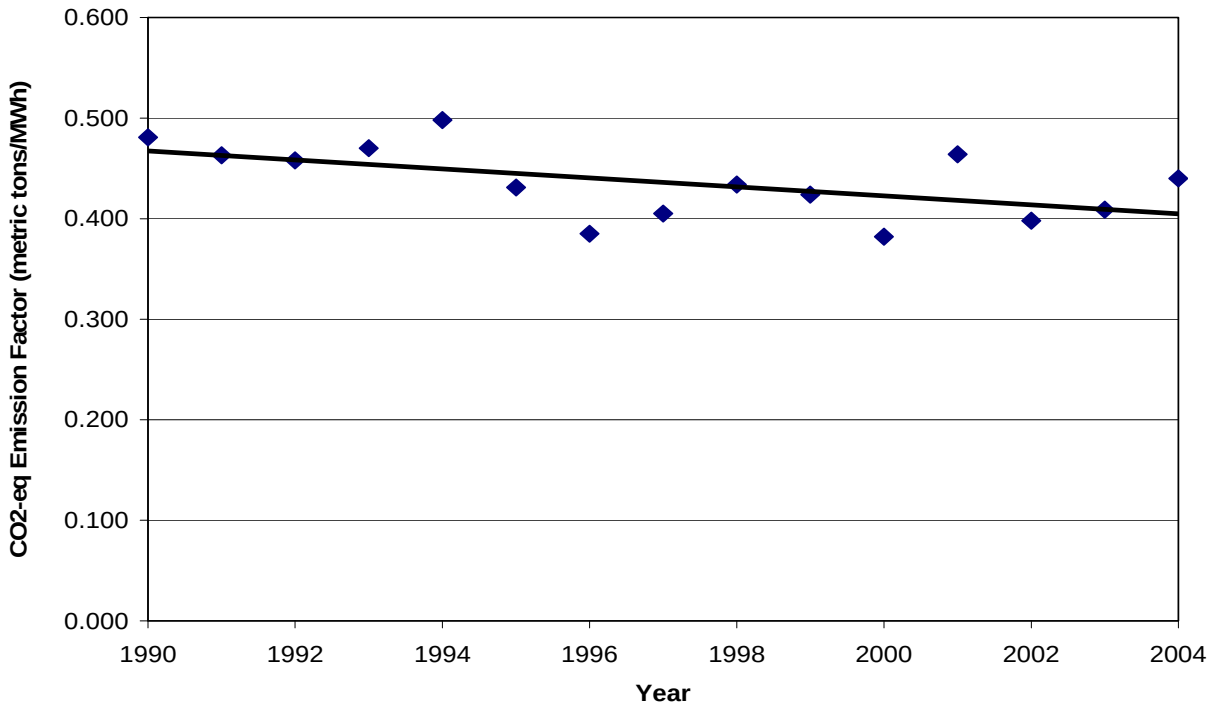
System Averages

Because most power plants are interconnected to a utility grid, and in turn to the WECC, it is also important to look at the proposed project in the context of all electricity systems delivering electricity to California consumers. **Greenhouse Gas Figure 1** shows the trends in GHG emission rates for each MWh consumed in California. From 1990 to 2004, California electricity became almost 20 percent cleaner on a GHG basis. This improvement was due in part to retirements of dirtier, less efficient plants, despite electricity demand growth of almost 20 percent from 1990 to 2004. Note that the trend line, a linear regression of the annual GHG emission rates, is a better representation of the statewide GHG emission rates than the actual number in any one year. GHG emissions and electricity consumption can vary from year to year due to variations in the availability of hydroelectric power, economic activity, and anomalous events such as the energy crisis of 2000-2001 and unusually warm weather conditions in 2004.

The proposed project, if it operates at its maximum permitted level, would have a GHG emission rate (0.003 mt CO_2-equivalent/MWh) that is significantly below the system wide average (the trend line in 2004 is approximate 0.400 mt CO_2-equivalent/MWh), thus would contribute to improve the overall system average. However, even considering if the project cannot be directly attributed to replacing higher-emitting power plant capacity, it would be difficult to conclusively determine whether the project would

result in a net decrease in GHG emissions, for several reasons. Because of the complex interchange among facilities that make up California's electricity system, it is possible that this project could displace electricity that may have otherwise been generated by more GHG intensive facilities, such as out-of-state coal plants or local old inefficient peaking units.

Greenhouse Gas Figure 1
GHG Emissions per Megawatt-hour Consumed in California



Source: ARB 2008f and CEC 2007b.

Therefore, even though staff can identify how many gross GHG emissions are attributable to a project, it is difficult to determine whether this will result in a net increase or decrease of these emissions, and, if so, by how much. It would, thus, be speculative to conclude that any given electricity generation project results in a cumulatively significant adverse impact resulting from greenhouse gas emissions.

Additionally, the quickly evolving GHG regulatory efforts currently being formulated may shortly establish the best *fora* for addressing GHG emissions from power plants rather than attempting to do so on an ad hoc or plant-by-plant basis. The applicant's goal is to have parts of CESF operational by May 2010, and the project fully online by the first quarter of 2012. ARB will have set forth each sector's reduction requirements as of January of 2009, followed by the adoption of specific regulations by January of 2011.

Ultimately, ARB's AB 32 regulations will address both the degree of electricity generation emissions reductions, and the method by which those reductions will be achieved, through the programmatic approach currently under its development. That regulatory approach will presumably address emissions not only from the newer, more efficient, and lower emitting facilities licensed by the Energy Commission, but also the

older, higher-emitting facilities not subject to any GHG reduction standard that this agency could impose. This programmatic approach is likely to be more effective in reducing GHG emissions overall from the electricity sector than one that merely relies on displacing out-of-state coal plants ("leakage") or older "dirtier" facilities.

As ARB codifies accurate GHG inventories and methods, it may become apparent that relative contributions to the inventories may not correlate to relative ease and cost-effectiveness of the GHG emission reductions necessary to achieve the 1990 GHG level. Though it has not yet been determined, the electricity sector may have to provide less or more GHG reductions than it would have otherwise been responsible for on a pro-rata basis.

To facilitate ARB's future regulatory regime, staff recommends Condition of Certification **GHG-1**, which requires the project owner to report the quantities of relevant GHGs emitted as a result of electric power production until such time that AB 32 is implemented and its reporting requirements are in force. It is possible that no reporting will ever be required by this condition if ARB's reporting requirements are in force prior to the first calendar year of plant operation. However, staff believes that **GHG-1**, with the reporting of GHG emissions, will enable the project to be consistent with the policies described above and the regulations that ARB adopts, and provide the information to demonstrate compliance with any applicable EPS that could be enacted in the next few years. The GHG emissions to be reported in **GHG-1**, are carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, HFCs and PFCs emissions that are directly associated with the production and transmission of electric power.

CUMULATIVE IMPACTS

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

This entire assessment is a cumulative impact assessment. The project alone would not be sufficient to 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 project will be subject to compliance with AB 32 requirements once they are determined by ARB. How the project will comply with these ARB requirements is speculative at this time but compliance will be mandatory. The GHG emissions reporting requirement under **GHG-1** does not imply that the project, as defined, will comply with the potential reporting and reduction regulations being formulated under AB 32. The

project may have to provide additional reports and GHG reductions, depending on the reporting requirements of the new regulations expected from ARB.

Since this power project would be permitted for less than a 60 percent annual capacity factor, the project is not subject to the requirements of SB 1368 and the Emission Performance Standard.

NOTEWORTHY PUBLIC BENEFITS

Greenhouse gas related noteworthy public benefits include the construction of renewables and low-GHG emitting generation technologies and the potential for successful integration into the California and greater WECC systems.

CONCLUSIONS

The CESF project could replace less efficient existing facilities with higher emissions of CO_2/MWh. It would be speculative to conclude that the project would result in a cumulatively significant GHG impact. AB 32 emphasizes that GHG emissions reductions must be “big picture” reductions that do not lead to “leakage” of such reductions to other states or countries. If a solar power plant is not built in California, electricity to serve the load will come from another generating source. That could be renewable generation like wind or solar, but it could also be from higher carbon emitting sources such as out-of-state coal imports or old inefficient units that are a still a significant part of the resource mix that serves California.

Staff recommends the interim reporting of the GHG emissions per Condition of Certification **GHG-1** as the Air Resources Board develops greenhouse gas regulations and/or trading markets required by the California Global Warming Solutions Act of 2006 (AB 32). The project may be subject to additional reporting requirements and GHG reduction or trading requirements as these regulations become more fully developed and implemented.

Staff does not believe that the small GHG emission increases from construction activities would be 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 project. Additionally, 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 staff believes that the use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. For all these reasons, staff concludes that the short-term emission of greenhouse gases during construction would be sufficiently reduced and would, therefore, not be significant.

The Carrizo Energy Solar Farm Project, as a solar project with a nightly shutdown will operate less than 60 percent of capacity and is therefore not subject to the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard. However, the

Carrizo Energy Solar Farms Project would easily comply with the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

PROPOSED CONDITIONS OF CERTIFICATION

Staff recommends the following condition of certification to address the greenhouse gas impacts associated with the construction and operation of the CESF project.

STAFF CONDITION

GHG-1 Until the California Global Warming Solutions Act of 2006 (AB 32) is implemented, the project owner shall either participate in a GHG registry approved by the Compliance Project Manager (CPM), or report on a annual basis to the CPM the quantity of greenhouse gases (GHG) emitted as a direct result of facility electricity production.

The project owner shall maintain a record of fuels types and carbon content used on-site for the purpose of power production. These fuels shall include but are not limited to each fuel type burned: (1) in combustion turbines, (2) boilers, heat recovery steam generators (if applicable) or auxiliary boiler (if applicable), (4) internal combustion engines, (4) flares, and/or (5) for the purpose of startup, shutdown, operation or emission controls.

The project owner may perform annual source tests of CO_2 and CH_4 emissions from the exhaust stacks while firing the facility's primary fuel, using the following test methods or other test methods as approved by the CPM. The project owner shall produce fuel-based emission factors in units of pounds CO_2-equivalent per million British Thermal Units (mmMMBtu) of fuel burned from the annual source tests. If a secondary fuel is approved for the facility, the project owner may also perform these source tests while firing the secondary fuel.

Pollutant	Test Method
CO_2	EPA Method 3A
CH_4	EPA Method 18 (VOC measured as CH_4)

As an alternative to performing annual source tests, the project owner may use the Intergovernmental Panel on Climate Change (IPCC) Methodologies for Estimating Greenhouse Gas Emissions (MEGGE). If MEGGE is chosen, the project owner shall calculate the CO_2, CH_4 and N_2O emissions using the appropriate fuel-based carbon content coefficient (for CO_2) and the appropriate fuel-based emission factors (for CH_4 and N_2O).

The project owner shall convert the N_2O and CH_4 emissions into CO_2 equivalent emissions using the current IPCC Global Warming Potentials (GWP). The project owner shall maintain a record of all SF_6 that is used for replenishing on-site transformers. At the end of each reporting period, the project owner shall total the mass of SF_6 used and convert that to a CO_2

equivalent emission using the IPCC GWP for SF_6. The project owner shall maintain a record of all PFCs and HFCs that are used for replenishing on-site refrigeration and chillers directly related to electricity production. At the end of each reporting period, the project owner shall total the mass of PFCs and HFCs used and convert that to a CO_2 equivalent emission using the IPCC GWP.

On an annual basis, the project owner shall report the CO_2 and CO_2 equivalent emissions from the described emissions of CO_2, N_2O, CH_4, SF_6, PFCs, and HFCs.

Verification: The project annual greenhouse gas emissions shall be reported, as a CO_2 equivalent, by the project owner to a climate action registry approved by the CPM, or to the CPM as part of the fourth Quarterly or the annual Air Quality Report, until such time that GHG reporting requirements are adopted and in force for the project as part of the California Global Warming Solutions Act of 2006.

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BIOLOGICAL RESOURCES

Brian McCollough

SUMMARY OF CONCLUSIONS

The Carrizo Energy Solar Farm (CESF) would impact 1020 acres of dry land farmed cropland and disturbed areas that provide habitat for multiple protected wildlife species. The CESF would also block or impair wildlife corridors and cause a loss of habitat that would result in impacts to multiple species. Further, these impacts involve not just the direct impact of the CESF, but cumulative impacts from two proposed PV projects in the Carrizo Plain as well.

Habitat compensation for permanent and temporary impacts remains an unresolved issue arising from two divergent views regarding the quality and importance of the habitat on the project site. Energy Commission biological resources staff, in consultation with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) have concluded that the 1020-acre project area connects blocks of natural land and important populations of the federally-endangered and state-threatened San Joaquin kit fox (*Vulpes macrotis mutica,* kit fox), and has an important role in the regional recovery strategy for the San Joaquin kit fox. Conversely, the applicant contends that the project site provides marginal kit fox foraging and pass-through habitat, and is merely a disturbed former agricultural field. These two divergent views about habitat quality and connectivity raise a number of important issues, including: (1) the appropriate compensation and mitigation requirements; (2) the applicant's proposed compensation of agricultural land to offset habitat loss; (3) pronghorn highway crossing locations, and (4) the potential for impacts to avian species. In addition, the project as currently proposed conflicts with the recovery plan for the San Joaquin kit fox with respect to kit fox corridor needs.

The applicant has proposed mitigation in their 2008 Biological Surveys Report to address habitat loss impacts for the San Joaquin kit fox, California Species of Special Concern American badger (*Taxidea taxus*), and the rare native game species pronghorn (*Antilocapra americana)* by providing 705 acres of agricultural lands or naturalized habitats. However, staff and the CDFG are concerned that the agricultural uses of this habitat could impair the habitat value of that land, resulting in a deficient compensation proposal. Staff, in consultation with CDFG and USFWS, believe that a significantly enhanced and expanded suite of measures will be required to mitigate these impacts. Staff believe that these should include at a minimum the provision of an appropriate amount of habitat compensation land, a suitable endowment to ensure the permanent care and protection of this land, and other mitigation measures yet to be developed. This habitat compensation land could mitigate for direct habitat loss impacts to kit fox, pronghorn, American badger, and burrowing owl (*Athene cunicularia*), and the rare native game species tule elk (*Cervus elaphus*), as well as mitigate for the loss of foraging habitat for raptors and California Species of Special Concern pallid bat (*Antrozous pallidus).* Mitigation for habitat loss remains an unresolved issue, and the applicant will need to work with staff, CDFG, and USFWS to identify the appropriate suite of mitigation measures, which will include the identification and protection of habitat compensation lands.

An additional 13 square miles of solar development is currently planned for the Carrizo Plain in addition to the 1 square mile project proposed by the applicant (see Project Description Figure 5). These proposed projects require a cumulative impact analysis. This cumulative analysis involves the participation of multiple agencies, including the USFWS, CDFG, San Luis Obispo County, and the Energy Commission staff to conduct an analysis and develop appropriate mitigation measures. One component of the cumulative analysis is a modeling effort to analyze wildlife corridors in the project area. This multi-agency corridor modeling process involves coordination with solar project developers in the Carrizo Plain to model existing land uses, habitat types, and known wildlife movements for the focal species of kit fox, pronghorn, and tule elk. This corridor modeling process will help guide the procurement of habitat compensation lands that would mitigate wildlife corridor impacts as well as direct habitat loss. However, it is possible that additional mitigation would be required to fully mitigate impacts to wildlife corridors.

Other details remain to be addressed, such as the need for the applicant to secure an Incidental Take Permit and Streambed Alteration Agreement from CDFG, and a Biological Opinion from the USFWS.

Due to insufficient information and unresolved issues between the applicant, agencies, and staff, Energy Commission staff is unable to conclude whether impacts to biological resources during construction and operation of CESF would be mitigated to less than significant levels. Similarly, staff cannot determine at this time whether the project would conform with all applicable Laws, Ordinances, Regulations and Standards (LORS).

INTRODUCTION

This section of the PSA provides the Energy Commission staff's preliminary analysis of potential impacts to biological resources from the construction and operation of the CESF. Information provided in this document addresses potential impacts to special-status species and areas of critical biological concern. This analysis also describes the biological resources at the project site and at the locations of ancillary facilities. This document explains the need for mitigation, the adequacy of mitigation proposed, and where necessary, specifies additional mitigation measures to reduce identified impacts to less than significant levels. It also describes compliance with applicable laws, ordinances, regulations, and standards, and recommends conditions of certification.

This analysis is based, in part, upon information provided in the Application for Certification (AFC) for CESF (CESF 2007), as well as responses to intervenor, staff, and public members' data requests (CESF 2008b, 2008c, 2008d, 2008e). This analysis is also based on site visits conducted on November 19, 2007 and January 23, 2008, the site visit and informational hearing conducted on January 29, 2008, the staff workshop on data responses and issues resolution conducted March 12, 2008, and the staff data response and issues resolution workshop conducted August 5, 2008, as well as discussions with the USFWS, CDFG, San Luis Obispo County, and applicant representatives.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The applicant would need to abide by the following LORS during project construction and operation as listed in Biological Resources Table 1.

Biological Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	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 provides for protection of threatened and endangered plant and animal species, and their critical habitat.
Migratory Bird Treaty (Title 16, United States Code, sections 703 through 711)	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.
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 from 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 which 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.
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.

State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations Title 14, section 670.7).
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.
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.
Native Plant Protection Act of 1977 Fish and Game Code sections 1900 et seq.	Designates rare, threatened, and endangered plants in the state of California.
California Environmental Quality Act (CEQA), Public Resources Code 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 CDFG's Special Animals List.
Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	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 streambed alteration agreement process.
Local	
San Luis Obispo County General Plan	The Open Space Element includes several goals and policies relating to biological resources in the county. These policies aim to conserve the County's natural resources, including rare species, significant habitats, and wildlife corridors.

SETTING

REGIONAL SETTING

The proposed CESF would be located in the northern portion of the Carrizo Plain, approximately 35 miles east of San Luis Obispo, 58 miles west of Bakersfield, and 135 miles northwest of Los Angeles. The project area is located along State Route 58 (SR-58) in San Luis Obispo County, roughly three miles north of the unincorporated community of California Valley. The Carrizo Plain is a basin roughly 50 miles long and six miles wide, with an elevation of approximately 2,000 feet, which drains internally to Soda Lake. The CESF would be located 8 miles northwest of the Carrizo Plain National Monument. The Carrizo Plain is bordered to the west by the Caliente Range and to the east by the San Andreas Fault and the Temblor Range (CESF 2007, BLM 1996).

PROJECT AREA & VICINITY DESCRIPTION

The project area would involve 1,020 acres; the 640-acre permanent project site and a 380-acre temporary construction laydown area. The project site is located north of SR-58 in Section 28 of Township 29 South, Range 18 East of the California Valley and La Panza NE USGS 7.5-minute series quadrangle maps. The 380-acre construction laydown and temporary manufacturing facility area would be located west and south of SR-58 in Section 33.

The project would connect to the transmission grid via the existing 230-kV Morro Bay-Midway transmission line immediately north of the project site (CESF 2007). The system impact study PG&E conducted in March 2008 (PG&E 2008) does not reach a conclusion about the necessity of reconductoring a 75-mile section of the Morro Bay-Midway transmission line. The transmission line corridor traverses largely undeveloped and unpopulated areas within San Luis Obispo and Kern counties, with a high likelihood of encountering sensitive biological resources (CESF 2008c). If reconductoring is required, additional biological surveys will be necessary to identify the presence of sensitive biological resources and the potential effects that reconductoring would have on those resources. The results of those additional surveys would provide the information necessary to avoid or mitigate potential impacts to biological resources along the transmission corridor.

The applicant conducted biological resource surveys of the property on which the proposed CESF power plant site and staging areas would be located as well as areas within a one-mile radius of the proposed project site. Some site surveys were conducted in 2007, but consultation with the CDFG determined the 2007 surveys were inadequate and that additional surveys would be necessary in 2008 (CDFG 2008b), resulting in Energy Commission Data Requests 79 and 80 (CEC 2008b). Four periods of focused botanical surveys were completed in March, April, and May of 2008 in accordance with CDFG and USFWS guidelines. Blunt-nosed leopard lizard (BNLL) surveys were conducted according to CDFG-protocols, including a series of 12 late spring and early summer adult surveys and a series of 5 juvenile surveys conducted in August and September of 2008. A reference site in the Elkhorn Plain was visited during each week of the survey period to confirm that BNLL were active and observable. San Joaquin antelope squirrel surveys following CDFG survey protocols were conducted concurrently with the BNLL surveys so long as the temperature remained within the levels for optimal San Joaquin antelope squirrel activity. Small mammal trapping was

conducted to sample the small mammal populations within the study area in 2008 (CESF 2008e). A road-killed kit fox was observed beside the highway near the construction laydown area in 2007, which shows that kit fox use the project site. Burrowing owls were detected on the project site in 2007 (CESF 2007), although no burrowing owls were detected in 2008 surveys. The owl burrow that was detected in 2007 had been destroyed by site preparation for planting (CESF 2008e).

Vegetation and Wildlife

The CESF site is located in the San Joaquin Valley Bioregion, which has a range of habitats including vernal pools, valley sink scrub and saltbush scrub, freshwater marsh, grasslands, arid plains, oak savannah, and agricultural uses such as cultivation of crops and rangeland. The northern portion of the Carrizo Plain has scattered rural homesteads and is a mosaic of dryland farming, cattle ranching, and fallow fields. Vegetation on the site and in the immediate project area consists primarily of disturbed vegetation typical of California annual grassland (Sawyer & Keeler-Wolf 1995). This disturbed vegetation community is characterized by non-native annuals such as redstem filaree (*Erodium circutarium*), popcorn flower (*Plagiobothrys* sp.), mustards (*Hirschfeldia* sp., *Brassica* sp.) and chess (*Bromus* sp.). Some native species such as needlegrass (*Nassella cernua)* and California poppy (*Eschscholzia californica)* are interspersed with the disturbance-adapted non-native species on the project site. Most of the project area consists of this disturbed vegetation, with an additional 27.4 acres of the project site consisting of developed areas occupied by two abandoned ranches. The remaining 386 acres of the project site are grazing or agricultural lands, including actively disked and plowed fields (CESF 2007).

The northern Carrizo's history of intermittently disturbed agricultural and rangeland uses provide some habitat value and allow for movement through the area of multiple wildlife species, including the pronghorn, tule elk, and the federally endangered and state-threatened San Joaquin kit fox. Typical bird species observed at the project site include common raven (*Corvus corax*), house finch (*Carpodacus mexicanus*), western kingbird (*Tyrannus verticalis*), western meadowlark (*Stunella neglecta*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). California ground squirrel (*Spermophilous beecheyi*), McKittrick pocket mouse (*Perognathus inornatus neglectus*), deermouse (*Peromyscus maniculatus*), cottontail rabbit (*Sylvilagus audubonii*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), and American badger were common mammals observed on the CESF site. Pronghorn, while once common in the area, were extirpated from central and southern California, and re-introduced by CDFG to the Carrizo Plain. A herd of pronghorn currently have a home range in the northern portion of the Carrizo Plain and are common in the vicinity of the project. Pronghorn were observed in the southern portion of the construction laydown area and frequently cross SR-58 at the project site (CESF 2007, CDFG 2008b). Tule elk are another native game species that were extirpated locally: however, CDFG has reintroduced them to the Carrizo Plain. The tule elk herd found in the project vicinity is one of only six herds that is larger than 150 animals, and has a calving ground near the project, and may use the project site (CDFG 2008a, 2008b).

Sensitive Habitats

The project is located 8 miles northwest of the Carrizo Plain National Monument. The monument encompasses the largest remaining example of habitats that were once abundant in the southern San Joaquin Valley. The 250,000-acre area contains an array

of rare plants and animals, including the greatest concentration of threatened and endangered vertebrates in the state (BLM 2007).

No wetland habitats exist on the project site, but Carrissa Creek, an ephemeral, seasonal drainage originating north and west of the project site crosses the construction laydown area before eventually draining 10 miles southeast into Soda Lake in the Carrizo Plain National Monument. The project proposes an access road into the laydown area that would require the construction of two creek crossings. The creek has a distinct channel, including two plunge pools formed during high flow events. The creek is usually dry, and vegetation, where present, consists of upland forbs (CESF 2008a). Although the drainage does not support wetland vegetation in the project site, there is seasonal wetland habitat downstream, including potential habitat for the western spadefoot toad (*Spea hammondii*), a California Species of Special Concern. Additionally, a preliminary delineation of jurisdictional waters was conducted, and an application for jurisdictional determination was submitted to the U.S. Army Corps of Engineers (USACE). Although the jurisdictional determination from the USACE headquarters has not been formally released, the applicant was told that the USACE would be asserting jurisdiction over Carrissa Creek, and the USACE has initiated the Endangered Species Act Section 7 consultation with USFWS (USACE 2008).

Special-Status Species

Biological Resources Table 2 lists special-status species that are known to occur or could potentially occur in the project area and vicinity. Many of these special-status plants and animals are unlikely to be impacted by the CESF due to lack of suitable habitat at the project site or because disturbance has eliminated these species locally. In a later section, staff provides an analysis of impacts by the project to special-status species.

Biological Resources Table 2
Special-Status Species Potentially Occurring in CESF Project Area

Plants	Scientific Name	Status*
Indian Valley spineflower	*Aristocapsa insignis*	__/__/1B.2
Heartscale	*Atriplex cordulata*	__/__/1B.2
Lost Hills crownscale	*Atriplex vallicola*	__/__/1B.2
San Luis Obispo mariposa lily	*Calochortus simulans*	__/__/1B.3
Dwarf calycadenia	*Calycadenia villosa*	FSC/__/1B.1
Lemmon's jewel-flower	*Caulanthus coulteri* var. *lemmonii*	__/__/1B.2
Hall's tarplant	*Deinandra halliana*	__/__/1B.1
Recurved larkspur	*Delphinium recurvatum*	__/__/1B.2
Round-leaved filaree	*Erodium macrophylla*	__/__/1B.1
Diamond-petaled California poppy	*Eschscholzia rhombipetala*	__/__/1B.1
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	__/__/1B.1
Pale-yellow layia	*Layia herterotricha*	__/__/1B.1
Munz's tidy-tips	*Layia munzii*	__/__/1B.2
Jared's pepper-grass	*Lepidium jaredi* ssp. *jaredi*	__/__/1B.2
Showy madia	*Madia radiate*	__/__/1B.1
Parish's checkerbloom	*Sidalcea hickmanii* ssp. *parishii*	FC/SR/1B.2
Invertebrates		
Vernal pool fairy shrimp	*Branchinecta lynchii*	FT/__
Longhorn fairy shrimp	*Branchinecta longiantenni*	FE/__
Amphibians		
Western spadefoot	*Spea hammondii*	__/CSC
Reptiles		
Blunt-nosed leopard lizard	*Gambelia sila*	FE/SE/FP
Birds		
Golden Eagle	*Aquila chrysaetos*	__/CSC/FP
Burrowing owl	*Athene cunicularia*	__/CSC
Ferruginous hawk	*Buteo regalis*	
Northern harrier	*Circus cyaneus*	__/CSC
Horned lark	*Eremophila alpestris*	__/CSC
Prairie falcon	*Falco mexicanus*	__/CSC_
California condor	*Gymnogyps californianus*	FE/SE/FP
Bald Eagle (wintering)	*Haliaeetus leucocephalus*	__/SE/FP
Loggerhead shrike (nesting)	*Lanius ludovicianus*	__/CSC
Oregon vesper sparrow	*Pooecetes gramineus affinis*	__/CSC
Mammals		
Nelson's or San Joaquin antelope squirrel	*Ammospermophilus nelsoni*	__/ST
Pronghorn	*Antilocapra americana*	
Pallid bat	*Antrozous pallidus*	__/CSC
Tule elk	*Cervus elaphus*	
Giant kangaroo rat	*Dipodomys ingens*	FE/SE
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	FE/SE
Tulare grasshopper mouse	*Onychomys torridus tularensis*	FE/CSC
McKittrick pocket mouse	*Perognathus inornatus neglectus*	
American badger	*Taxidea taxus*	__/CSC
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/ST

***Status Legend** (Federal/State/California Native Plant Society (CNPS) lists, CNPS list is for plants only): **FE** = Federally listed Endangered; **FT** = Federally listed Threatened; **FC** = Candidate Species for Listing; **SE** = State-listed Endangered; **ST** = State-listed Threatened; **SR** = State-listed Rare; **FP** = Fully Protected against take; **CSC =** California Species of Concern; **List 1B** = Rare or Endangered in California and elsewhere; **.1 =** Very endangered in California; **.2** = Rare, threatened, or endangered in California, more common elsewhere; **.3 =** Not very endangered in California; __ = not listed in that category. (Sources: CESF 2007a; CNDDB 2008).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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. The significance of the project activity is in large part dependent on the setting and the existing LORS for the particular site. For example, disturbance during construction on a "brownfield" (i.e., developed) site may not be significant, but this same activity on a "greenfield" (i.e., undeveloped) site may be significant because of the greater likelihood of sensitive biological resources in the area.

Generally, staff relies on the rules and regulations of USFWS, USACE, and CDFG in assessing significance. Those agencies have special expertise in addressing biological resources, and staff finds that absent unusual circumstances, compliance with the requirements they have adopted or would adopt but for the Commission's exclusive jurisdiction would be sufficient to avoid or mitigate significant impacts.

Significant biological resource impacts would occur if special-status species, such as state- or federal-listed species, state fully protected species, candidates for state or federal listing and/or Species of Special Concern, are likely to be impacted from the construction or operation of the proposed project. Other significant impacts include:

- interruption of species migration;
- reduction of native fish, wildlife and plant habitat, causing a fish or wildlife population to drop below self-sustaining levels;
- disturbance of wetlands, marshes, riparian areas or other wildlife habitat;
- harassment of a protected species, even if it does not result in the loss of habitat or reduction in population numbers; and
- substantial degradation of the quality of the environment or environmental effects that are individually limited, but cumulatively considerable.

Compliance with LORS is typically sufficient to avoid or mitigate these impacts.

DIRECT AND INDIRECT IMPACTS AND MITIGATION

The California Environmental Quality Act (CEQA) Guidelines define "direct" impacts as those impacts that result from the project and occur at the same time and place. Indirect impacts are caused by the project, but can occur later in time or farther removed in distance and are still reasonably foreseeable and related to the operation of the project. Significance of impacts is generally determined by compliance with applicable LORS; however, guidelines adopted by resource agencies may also be used. This section analyzes the potential for direct and indirect impacts of construction and operation of the proposed project to biological resources and provides mitigation, as necessary, in an effort to reduce the severity of potentially adverse impacts.

The California Endangered Species Act (CESA) requires that the impacts of the authorized take of threatened or endangered species shall be minimized and fully mitigated. The measures required to meet this obligation shall be roughly proportional in extent to the impact of the authorized taking on the species (Fish and Game Code § 2081subd.(b)(2)).

Construction Impacts and Mitigation

Many of the proposed CESF's impacts to biological resources would begin with project construction and continue through the operational phase of the project and are discussed in this subsection. Construction specific impacts and appropriate mitigation measures are discussed in this subsection as well, with impacts and mitigation specific to operation of the proposed discussed in a following subsection.

Power Plant Site

The proposed project would have two distinct, adjacent areas that would affect plant and wildlife habitat: the proposed power plant site and a construction laydown area. The CESF power plant site and construction laydown area currently contain existing structures, which would be demolished to clear the site for development of the proposed power plant (CESF 2007, CESF 2008c). The power plant would permanently disturb a total of approximately 640 acres. The 380-acre construction laydown area south of SR-58 would contain the temporary laydown area and the 50,000 square-foot on-site fabrication facility. Following the 35-month construction phase of the project, the temporary fabrication building would be removed and the laydown area would be returned to its "as found" agricultural condition (CESF 2008c).

Construction Impacts to Special-Status Plants

Rare plant surveys were conducted during the dry 2007 season, and also during the 2008 season. An individual of pale-yellow layia was found near the abandoned homestead on the project site. According to the California Native Plant Society's Inventory of Rare and Endangered Plants, this species is a List 1 B.1 species, which means it is rare, threatened, or endangered in California and elsewhere, and seriously endangered in California (CNPS 2008). While the applicant characterizes loss of a single individual as less than significant, this individual is representative of a larger population of a rare species. It is possible that conditions were not conducive for germination and flowering in 2008, but no other populations were visited to determine this. Staff has suggested mitigation measures (e.g., preservation of existing off-site occurrences, creation of off-site occurrences through transplantation or seed collection) in the event that rare plants are located in the project area and loss of plants is unavoidable. Staff recommends the applicant conduct rare plant surveys according to CDFG protocols in 2009, and salvage seed from flowering rare plants that are found (see proposed Condition of Certification **BIO-11**). The applicant will develop a rare plant mitigation plan, with the input and approval of CDFG and Energy Commssion biological resources staff. The details of a rare plant mitigation plan will be approved by Energy Commission staff and CDFG, and included in the project's Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP, see proposed Condition of Certification **BIO-6)**.

Construction Impacts to Special-Status Wildlife

The disturbed vegetation and dryland farming activities at the power plant site provides suitable habitat for the following special-status wildlife: nesting or migratory birds, San Joaquin kit fox, American badger, and burrowing owl, and foraging habitat for the pallid bat and potentially for the California condor (*Gymnogyps californianus*). The CESF project area is important flat-land kit fox habitat because it provides suitable habitat between the core Carrizo Plain kit fox population in the Carrizo Plain National Monument to the south and the Salinas-Pajaro population to the northwest and western Kern populations to the east. The 1020-acre project area serves to connect blocks of natural land to core and other populations, and is intended to play an important role in the regional strategy to recover the San Joaquin kit fox.

San Joaquin kit fox use agricultural land where undisturbed land is maintained nearby which allows for denning sites and a suitable prey base. According to the *Recovery Plan for Upland Species of the San Joaquin Valley*, "Kit foxes also den on small parcels of native habitat surrounded by intensively maintained agricultural lands, and adjacent to dryland farms" (USFWS 1998). American badger also dig burrows in friable soils, and depend on small mammals for prey. Kit fox change dens frequently, sometimes only using a den for two or three days (USFWS 1998), and may use vacant badger dens for shelter (CDFG 2008a). The CESF project site is active territory for American badger, and provides foraging and potential shelter habitat for kit fox.

The Federal and state recovery strategy for the San Joaquin kit fox depends on the enhanced protection and management of three distinct core populations. These core populations include two large populations separated by the Temblor Range, the Carrizo Plain population, centered in the Carrizo Plain National Monument, and the Elk Hills/ western Kern population. The third core population is the smaller Ciervo-Panoche population 100 miles to the northwest. There are also several smaller but potentially isolated kit fox populations, including the kit fox population in the area of the Salinas River and Pajaro River watersheds (USFWS 1998).

The project area provides foraging habitat for the California Species of Special Concern pallid bat, which feeds extensively on grasshoppers and other insects, using its large ears to hear the insect's footsteps, and then swooping down to feed (CDFG 2008a). Additionally, burrowing owl, another California Species of Special Concern was detected on the project site in 2007 surveys (CESF 2007). Although no burrowing owl were detected in 2008 surveys as the existing burrow was destroyed by agricultural site-clearing activities, burrowing owls are often associated with other burrowing animals, including ground squirrels and badgers (CESF 2007). Although the California condor is not currently active in the vicinity of the CESF (CESF 2008e), there is a possibility that condors may be encouraged to return to the area (CDFG 2008a). Staff is continuing to coordinate with USFWS and CDFG to determine the potential for the CESF to impact condors.

The applicant has proposed several impact avoidance and mitigation measures, which staff has incorporated into several suggested conditions of certification. Condition of Certification **BIO-5** describes a worker environmental awareness training program to inform workers about sensitive biological resources and how to avoid impacting them.

The creation and use of a BRMIMP is incorporated into Condition of Certification **BIO-6.** Staff's suggested Condition of Certification **BIO-8** outlines mitigation measures to avoid harassment or harm of sensitive wildlife, including maintenance monitoring of permanent exclusionary fencing, and the prohibition of bringing pets on site. The suggested Condition of Certification **BIO-9** requires the project owner to conduct nesting or migratory bird surveys and schedule work outside the nesting season or establish buffers to avoid impacts. Power plant construction could result in direct and cumulative impacts to these species due to habitat loss, obstruction of wildlife corridors, or injury of individuals.

Construction Impacts to Wildlife Corridors

The existing land uses on the project site provide some habitat value and allow for movement of multiple wildlife species, including the pronghorn, tule elk, American badger, and the federal and state endangered San Joaquin kit fox. Pronghorn cross State Route 58 at the project site; this crossing location may be crucial to maintaining connectivity within the home range of one of the pronghorn herds and within the entire San Luis Obispo County pronghorn population. Tule elk are known to utilize the project site and may use it for calving (CDFG 2008a).

The potential impacts of the project on pronghorn were stated by CDFG in their letter dated March 27, 2008:

> "Loss of foraging area and habitat connectivity would extend well beyond the Project footprint. Pronghorn are inherently wary of human activity and structures. Light, noise, buildings, reflectors, and human activity would likely cause pronghorn to avoid the Project area during and after construction by a wide margin, rendering much of the area surrounding the site unusable. Increased traffic on SR-58 would also reduce the crossing opportunities and increase the road kill risk for this diurnal species. The proposed impermeable fencing is also likely to inhibit fawns and adults during pursuits, thereby increasing coyote predation. This is a known effect on pronghorn of livestock fencing and would be even greater with the proposed chain-link fence. We recommend that the impact analysis consider an additional buffer, supported by literature on pronghorn behavior, around the Project site as permanently unusable for pronghorn. Then the impact analysis should assess the viability of this population considering the population size, recruitment rates, existing and proposed land uses (cumulative effects), forage and fawning opportunities, watering sites, traffic increases, and the Project's direct and indirect habitat impacts. The Department can provide bi-annual herd counts, Global Positioning System (GPS) locations, sex ratios, and fawn count data."

The applicant did receive some data regarding pronghorn from CDFG, but misunderstood the origin of the data and its implications. The pronghorn data points received by the applicant were from aerial surveys, not radio telemetry as stated in the applicant's 2008 Biological Surveys Report (CESF 2008e). The applicant also states in the surveys report that there are three SR-58 highway crossings for pronghorn, with the furthest east crossing also used by tule elk. CDFG has observed only a single

pronghorn crossing, at the project site. CDFG observations indicate that the elk herd does not cross SR-58 (CDFG 2008a).

The applicant incorrectly describes the project area as not an important corridor area in the USFWS Recovery Plan for Upland Species of the San Joaquin Valley. The project area is in the corridor linking the Carrizo Plains National Monument to satellite populations of San Joaquin kit fox in the Salinas River and Pajaro River watersheds (CDFG 2008b). The federal Recovery Plan for Upland Species of the San Joaquin Valley identifies this corridor as essential to maintaining and recovering those kit fox populations and the species, as connections between populations counteract inbreeding or declines in any one population. The specified recovery action which applies to this site is: "Protect and enhance corridors for movement of kit foxes through the Salinas-Pajaro Region and from the Salinas Valley to the Carrizo Plain and San Joaquin Valley" (USFWS 1998).

As stated in the California Department of Fish and Game's (CDFG) comment letter of March 26, 2008:

> "The impact analysis and mitigation must consider the potential impacts to the corridor and corridor functions. The "Wildlife Corridors" section in the application does not recognize the kit fox corridor and mischaracterizes the site as an east-west corridor connecting the Temblor and Caliente mountain ranges. Potential corridor impacts to be evaluated should include, but not be limited to, loss of prey base and refugia for immigrating, emigrating, and dispersing individuals, reduced capacity for individuals to reside in the corridor, reduced genetic flow, increased predation resulting from impermeable fences (blocked escape routes), increased exposure to predation due to night lighting, increased exposure to traffic on the highway due to the impermeable fence, reduced corridor width, and increased animal/vehicle traffic collisions due to traffic increases" (CDFG 2008b).

In addition, the development of additional solar projects in the Carrizo Plain, including the proposed OptiSolar's 8.5 square-mile Topaz project and the SunPower High Plains Ranch 4.5 square-mile project getting developed by SunPower represent significant cumulative impacts to biological resources, both from habitat loss and impacts to wildlife corridors, and will be discussed in more detail in the cumulative impacts section.

Mitigation for Wildlife Corridors

In order to develop a consistent analysis and mitigation approach to address the potential impacts from direct habitat loss and reduced habitat connectivity, the USFWS, CDFG, Energy Commission staff, and San Luis Obispo County are developing a multi-agency collaborative analysis process. This multi-agency process will involve coordination with solar project developers in the Carrizo Plain to model existing land uses, habitat types, and known wildlife movements for the San Joaquin kit fox, pronghorn, and tule elk. This corridor modeling will be conducted so that baseline conditions, potential projects, and proposed mitigation can all be evaluated to ensure that all impacts are identified and fully mitigated. The use of GIS-based tools, like the Corridor Designer program (www.corridordesign.org), will allow modeling of existing conditions, wildlife movement with the proposed project, and testing of potential

mitigation measures. The use of corridor modeling for the focal species of San Joaquin kit fox, pronghorn, and tule elk is likely to identify corridor needs of other species in the vicinity, and is in line with the federal upland species recovery plan approach of using kit fox as an "umbrella species" (USFWS 1998).

The applicant has proposed some mitigation measures for impacts to species that would be affected by the proposed CESF, including the purchase of a 705-acre agricultural easement adjacent to the project site, modification of fencing along SR-58, maintaining a watering facility on the southeast corner of the laydown area, and additional watering facilities along the western edge of the project and laydown area. These proposed mitigation measures will be evaluated during the wildlife corridor modeling process; however additional mitigation is likely to be necessary. Staff and CDFG believe that the applicant's proposed mitigation is insufficient to meet the California Endangered Species Act (CESA) obligation that project impacts be fully mitigated. The applicant's proposed watering facilities will need to be evaluated, as this may expose the pronghorn to increased likelihood of predation.

Mitigation for impacts to wildlife corridors may require conservation and enhancement of remaining undeveloped lands within the corridor or the use of additional conservation easements. Some of these conservation easements may allow or encourage existing land uses that benefit wildlife, such as the dryland farming which provides valuable late-season forage for pronghorn, to continue. These easements would prohibit conversion of the easement lands to uses with no benefit to wildlife. Other potential wildlife corridor mitigation may include replacement of fencing with fencing that allows passage of pronghorn, the construction of special fence crossings, and additional signage or other measures yet to be developed.

Habitat Loss and Compensation

In addition to impacts to wildlife corridors, the project would directly impact sensitive species habitat. San Joaquin kit fox were assumed by the applicant to be present on the project site (CESF 2007), and the 640-acre solar facility would represent a permanent loss of habitat. The applicant characterizes the site as pass-through habitat and marginal foraging habitat, with the presumption that badger territory onsite would preclude the establishment of San Joaquin kit fox dens (CESF 2008e). CDFG disagrees and states that badgers often create dens that San Joaquin kit fox will use (CDFG 2008a). Additional habitat impacts to wildlife include the decreased capacity of areas surrounding the project to support wildlife due to the loss of escape routes caused by a large, impassable barrier such as a large solar power plant and the increased predation that would result.

San Luis Obispo County, in conjunction with CDFG, has developed an analysis process for permitting and determining the amount of habitat compensation within kit fox habitat areas in the county.

Projects such as the CESF that are larger than 40 acres are required to complete a San Joaquin kit fox habitat evaluation that is used to judge the quality of habitat that a project would impact and the compensation ratio that would be required. The habitat quality is measured on a 100-point scale, with a score of zero indicating no habitat

impacts to kit fox, and a score of 100 indicating the potential for substantial impacts to important kit fox habitat. If the project area scores between 50 and 59, then a compensation ratio of 1:1 is required, with the ratio increasing for each 10-point increase in score, so that a project scoring 90 or higher would be required to compensate at a ratio of 5:1 (CDFG 2008a).

The applicant completed the habitat evaluation and arrived at a score of 50, suggesting a compensation ratio of 1:1. However, Energy Commission staff, in coordination with CDFG, completed the habitat evaluation for the CESF and arrived at a score of 92 for the project site, and a score of 87 (CDFG 2008a) for the construction laydown area. The habitat evaluation results calculated by CDFG and staff would result in a habitat compensation ratio of 5:1 for the project site and 4:1 for the laydown area (forms attached in Appendix A).

The USFWS considers impacts to be “temporary” if they persist for 2 years or less, (USFWS 2008a). The construction laydown area would be in use and not available for use by badger and kit fox for at least 35 months, which the USFWS would consider to be a “permanent” impact. The nearly three-year period of disturbance for the construction laydown area could impact an entire generation of these animals. The isolating nature of the large barrier posed by the construction laydown area can impact the viability of local populations, prevent juvenile dispersal, and have implications for the gene flow and viability of other populations in the region.

The U.S. Fish and Wildlife Service (USFWS) has already indicated that compensation lands would need to benefit the Carrizo Plain core population of San Joaquin kit fox, particularly the connection to West Kern kit foxes north and east through Bitterwater Valley (USFWS 2008a). If the habitat compensation land is also suitable habitat for other impacted species, such as the California Species of Special Concern pallid bat, American badger, and burrowing owl, then this compensation land would also serve to mitigate habitat impacts for these species. Additionally, if the habitat compensation lands are in areas that would benefit wildlife corridors, then the habitat compensation land could potentially mitigate some of the wildlife corridor impacts as well.

The applicant has proposed designating a 705-acre agricultural easement as mitigation for impacts to San Joaquin kit fox habitat at a 1.1:1 ratio. However, the conservation of an adjacent area does not offset the 640-acre net loss of kit fox habitat, and the USFWS will not accept an agricultural easement as habitat compensation (USFWS 2008a). The applicant must coordinate with staff, CDFG, and USFWS to establish the easement conditions for the habitat compensation lands, find a public agency or approved non-profit organization, such as the California Wildlife Foundation (CDFG 2008a), to manage the easement, and establish a non-wasting endowment for the management of the property in perpetuity, as recommended in staff’s proposed Condition of Certification **BIO-17**.

The applicant observed several other special-status bird species (e.g., golden eagle, prairie falcon, horned lark) in the project area that could experience direct impacts due to loss of foraging habitat. The loggerhead shrike (*Lanius ludovicianus*) and Oregon vesper sparrow (*Pooecetes gramineus affinis*), both California Species of Special Concern, were not mentioned by the applicant, but are known to occur on the project

site (CDFG 2008b) and would be directly impacted by loss of habitat from construction of the CESF. The burrowing owl is a California Species of Special Concern and a USFWS bird of conservation concern (CDFG 1995). This species is assumed present on the project site, and was observed on the project site during 2007 surveys (CESF 2007). The applicant states that burrowing owls will still be able to use the site after construction of the project, but staff and CDFG believe the extensive vertical columns and guy wires will likely preclude burrowing owls from using the site once the project is built (CDFG 2008a).

Other raptors known to occur in the Carrizo Plain include red-tailed hawk, American kestrel, northern harrier, ferrunginous hawk (*Buteo regalis*), and bald eagle (*Haliaeetus leucocephalus*) as well as the potential for the state and federal endangered California condor to forage in the area. In addition, non-native grassland and developed or disturbed areas typical of the existing site conditions may provide nesting habitat for ground-nesting birds. The loss of active bird nests or young is regulated by the federal and state Migratory Bird Treaty Act. These impacts are significant, and the applicant has proposed mitigation that is discussed below and incorporated into staff's conditions of certification, to avoid and minimize impacts to nesting birds, special-status wildlife, and other biological resources on the power plant site.

Important components of compensation are an endowment and initial enhancement funds to prepare the land for mitigation use. This funding would be calculated in a manner that ensures the adequate funding of land and species monitoring and maintenance requirements in perpetuity. The Property Analysis Record (PAR) is a commonly used and accepted software tool developed by the Center for Natural Lands Management (2008) to help land managers calculate endowment amounts for specific projects. This analysis could be performed by staff following licensing or be performed by a staff and CDFG-approved third party land manager who could acquire land on behalf of the applicant. The PAR facilitates an analysis of property characteristics to determine management requirements, estimates costs of both management and administration, and generates a report, which can form the basis of a suitable, long-term endowment.

Once staff receives outstanding information from the applicant, staff will likely propose additional terms and conditions proposed by staff in the Final Staff Assessment. The applicant's draft Biological Assessment has been revised to reflect 2008 biological survey data, and submitted to the U.S. Army Corps of Engineers (USACE) and USFWS for preparation of the Biological Opinion, and issuance of the federal Endangered Species Act take permit. The applicant has not yet filed a Section 2081 Incidental Take Permit application or Streambed Alteration Agreement application with CDFG.

Potential compensation lands for mitigation of impacts to biological resources from loss of habitat, migratory corridor impacts, and cumulative impacts have yet to be identified. The implementation of additional mitigation measures in combination with habitat compensation may be required to fully mitigate the impacts of the proposed project. The large scale of the proposed CESF may require a regional perspective for implementation of mitigation measures, including potential actions in areas of regional importance to sensitive species, such as the Carrizo Plain National Monument. The scale of the proposed project, combined with the geographic constraints of the Carrizo

Plain, may result in the need for a suite of mitigation measures beyond just the acquisition and protection of habitat compensation lands. The applicant, Energy Commission staff, CDFG, and USFWS will all need to be involved in the selection of appropriate compensation lands and other mitigation measures to ensure that all impacts are fully mitigated, as required by staff's proposed Condition of Certification **BIO-17**.

Impacts from Construction Activities and Mitigation

To address general biological resource impacts that might occur during project construction, the applicant proposed several mitigation measures, including pre-construction surveys for sensitive species, worker environmental awareness training, construction monitoring of sensitive resources, and construction monitoring and compliance reports that analyze the effectiveness of the mitigation measures (CESF 2007, 2008c). The applicant also proposed that vegetation clearing shall occur from September 1 to March 1, to avoid the bird breeding season

Staff agrees with the applicant's proposed mitigation measures and has incorporated them into the following conditions of certification to address general impacts to biological resources. Condition of Certification **BIO-1** requires the selection of a qualified Designated Biologist by the project owner. A qualified Designated Biologist is necessary to oversee the implementation of mitigation measures for impacts to biological resources. Condition of Certification **BIO-2** outlines specific duties that the Designated Biologist must carry out to mitigate impacts. Condition of Certification **BIO-3** outlines the qualifications for any Biological Monitors assigned to assist the Designated Biologist. Condition of Certification **BIO-4** describes the authority of the Designated Biologist and the Biological Monitor to ensure that impacts to biological resources are avoided to the extent possible. Condition of Certification **BIO-5** describes a Worker Environmental Awareness Program that would be required to ensure that construction personnel do not cause additional impacts biological resources during construction of the project. Condition of Certification **BIO-6** describes a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) that would be prepared by the applicant that describes all measures necessary to ensure compliance with LORS and minimization of impacts related to special-status species and other biological resources. Condition of Certification **BIO-7** requires the applicant to incorporate feasible measures to avoid impacts to biological resources in the project design. Condition of Certification **BIO-8** outlines measures designed to avoid harassment and harm to wildlife during construction of the project.

If the project is unable to avoid impacting Carrissa Creek, the applicant would likely need a Clean Water Act Section 401 certification from the Central Coast Regional Water Quality Control Board, a Section 404 permit from the U.S. Army Corps of Engineers, and a Streambed Alteration Agreement from CDFG (see proposed Conditions of Certification **BIO-9, BIO-13, BIO-14,** and **BIO-16**). Similarly, Soda Lake in the Carrizo Plain National Monument could also be potentially impacted by construction activities in Carrissa Creek. Water quality in Carrissa Creek and Soda Lake could be impacted by discharge of materials released during construction, or by migration of any existing toxic materials present in the subsurface soils and groundwater into stormwater runoff from the project site. During and after construction, drainage and sedimentation

control measures would be implemented to limit the discharge of potentially contaminated sediment from the site. Staff's ***Soil and Water Resources*** analysis provides a more detailed discussion of potential soil, water quality, and aquifer recharge issues for the CESF project.

Transmission Line

Transmission lines are known to be a collision and/or electrocution threat to birds. The threat of collision and/or electrocution is greater when the transmission line is on a migratory pathway or adjacent to a water body in which there might be large flocks of birds. The project would tie into the existing 230kV Morro Bay—Midway transmission line 90 feet north of the project site (CESF 2007). Given the short length of the transmission line that would need to be constructed adjacent to the disturbed project site, staff concludes that the construction of the transmission line would not significantly impact biological resources.

Construction Lighting

Under certain circumstances, lights can disorient migratory birds flying at night, or attract wildlife such as insects and insect-eaters. An increase in light and glare at the site would be expected to occur during construction and operation of the project. During periods when nighttime construction would take place, illumination that meets state and federal worker safety guidelines would be required. Nighttime lighting would be directed onsite, and non-glare fixtures, task-specific lighting, shields, and devices to minimize lighting time would be used to minimize significant light and glare (CESF 2008b). The applicant has proposed light minimization measures (discussion in the ***Visual Resources*** section) that staff has proposed in Visual Resources Conditions of Certification **VIS-1:** staff concludes there would be no significant impacts to sensitive species from the lighting associated with construction and operation of the new facility if Condition of Certification **BIO-7**, which describes the use of fixtures to prevent side casting of light, is implemented.

Construction Noise

Construction activities would result in elevated noise levels at the project site. Excessive noise levels can cause birds to abandon nests and associated vibration can result in the collapse of burrows. The applicant has proposed mitigation, such as timing construction outside the breeding season of sensitive species and conducting biological monitoring, to minimize the direct impact of noise to sensitive biological resources surrounding the site. Staff has included Condition of Certification **BIO-9**, which describes setbacks from active bird nests, and **BIO-10**, which specifies construction setbacks from active burrowing owl burrows or the use of visual and noise barriers, to mitigate potential noise-related impacts to the burrowing owl. With implementation of species-specific mitigation discussed above, staff concludes there would be no significant impacts to biological resources from increased construction noise.

Construction Traffic

Traffic impacts to biological resources from operation of the CESF include increased frequency of animal/vehicle collisions, as well as increased avoidance of local roads due to increased traffic. Data submitted in the applicant's Supplement to the AFC

(CESF 2008c) indicates that during the construction phase of the project, peak hour traffic volume on SR-58 at Soda Lake Road would increase from a peak traffic volume of 58 vehicles/hour in the 2010 no project condition to 190 vehicles/hour for the AM peak hour (CESF 2008c). Analysis of this increase in traffic will be modeled by staff and incorporated in the wildlife corridor impact and mitigation analysis. The traffic impacts to biological resources from the construction of the CESF and the appropriate mitigation will be discussed in the Final Staff Assessment.

Operation Impacts and Mitigation

Potential operation impacts include impacts to birds due to collision with the project facilities, collision or electrocution by the transmission line, disturbance to wildlife due to increased noise and lighting, and impacts to wildlife from increased road traffic.

Bird Collisions and Mortality

Birds are known to collide with transmission lines and other elevated structures, causing injury and fatality. It is possible that birds could collide with the transmission lines or project facilities. Additionally, the effects of this type of solar collector on wildlife are currently unknown. Avian mortality has been reported at Solar One, a central receiver solar power plant that was operating outside Daggett, California in the Mojave Desert. Solar One consisted of a site of approximately 80 acres covered with 1818 mirrors, or heliostats, each of which was approximately 74 square feet in area. These heliostats focused the sun on a centrally located, tower-mounted boiler. When not directed at the tower, the heliostats were focused at standby points, which were four small (16 feet diameter) points at a height of 260 feet. The temperatures at the standby points varied with the number of heliostats and amount of sunshine, but were high enough to burn feathers and small insects. Most of the avian mortality was from collisions with structures, although some birds died in the standby points (McCrary, et al. 1986). While this study does raise some concerns, the CESF is using a different technology that would impact wildlife in a different manner. The Fresnel mirrors of the CESF focus solar radiation to a focal point within the elevated receiver structures, which contain specially coated steel pipes within an insulated cavity. The design of the linear mirrors would result in a line of reflected sunlight focused on the receiver structure 56 feet in the air. This linear design does not result in single points of extremely intense solar radiation similar to the standby points that caused some avian mortality at Solar One. This receiver structure may prevent any flying organisms from receiving concentrated solar radiation. However, there may be potential impacts to wildlife, including exposure to elevated temperatures and solar radiation. Animal behavior usually would result in avoidance of heat or glare, and staff expects that birds and insects will typically avoid the solar field while it is in operation. This has been the observed pattern of behavior in the SEGS Kramer Junction and Harper Lake facilities' parabolic trough solar plants (York 2008).

The 56-foot tall receiver structures would require guy wires for stabilization, resulting in a network of guy wires throughout the solar field (CESF 2007). These guy wires may pose a collision threat, and could require the use of bird flight diverters or other mitigation measures to reduce the likelihood of bird collisions. Staff will continue working with the applicant, USFWS, and CDFG to assess the potential for impacts to sensitive

birds, including California condor, and will discuss the potential impacts and recommended mitigation measures in the Final Staff Assessment.

Electrocution

The construction of any necessary transmission lines with conductor wire spacing greater than the wingspans of large birds to help prevent electrocution, as described in *Suggested Practices for Avian Protection on Power Lines*: *The State of the Art in 2006,* is recommended (APLIC 2006). With the proposed mitigation included in staff's proposed Condition of Certification **BIO-7,** staff concludes that the proposed facility and transmission lines would not pose a significant electrocution threat to bird populations.

Noise and Lighting

Impacts from noise and lighting due to operation of the project are potentially significant. Although plant operations would create additional noise, it is likely that resident animals in the area would be able to habituate to routine noise. The noise levels that can result in behavior changes start at a range from 60 dB(A) to 85 dB(A) (Knight and Gutzwiler 1995; Sarigul-Klijn 1997), depending on the study and the species. Noise modeling shows that while the project is operating, the 55 dB(A) noise contour only slightly leaves the project site just north of the power block (CESF 2008c), and so noise levels that would impact animal behavior will not extend beyond the project boundaries. Staff concludes that operational noise will not result in significant impacts to biological resources.

Impacts to biological resources due to lighting are not expected to be significant. Non-glare fixtures and restriction of lighting to areas in which it is needed would minimize impacts of lighting to biological resources. Noise and light impacts to resident and migratory wildlife would be mitigated by implementation of staff's proposed conditions of certification in the ***Noise and Vibration*** and ***Visual Resources*** (**VIS-5**) sections as well as **BIO-7** and **BIO-10**. The suggested Condition of Certification **VIS-5** recommends that all permanent exterior lighting be designed to minimize spill light beyond the project site, reflected glare, and illumination of the project and its immediate vicinity. Staff's proposed Condition of Certification **BIO-7** requires the applicant to implement impact avoidance features, such as the use of lighting fixtures to prevent side casting of light. **BIO-10** describes burrowing owl impact avoidance and minimization measures, including pre-construction surveys, and the use of a 500-foot setback and of visual and noise barriers to shield any active burrows.

Traffic

Traffic impacts to biological resources from operation of the CESF include increased frequency of animal/vehicle collisions, as well as increased avoidance of local roads due to increased traffic. Data submitted in the applicant's Supplement to the AFC indicates that peak hour traffic volume on SR-58 at Soda Lake Road would increase from a peak traffic volume of 60 vehicles/hour in the 2011 no project condition to 98 vehicles/hour with the CESF project operating (CESF 2008c). Analysis of this increase in traffic will be modeled by staff and incorporated into the ongoing wildlife corridor impact and mitigation analysis, and the traffic impacts to biological resources from the operation of the CESF and the appropriate mitigation will be discussed in the Final Staff Assessment.

CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., tit. 14, section 15130).

The Arco Solar facility directly east of the project site has been dismantled, but the PG&E property it occupied remains fenced, excluding wildlife. Two additional solar projects are proposed in the vicinity of the one square mile CESF, including the proposed Optisolar Topaz photovoltaic project which may occupy 8.5 square miles north and west of the project site, and the proposed 4.5-square mile SunPower project six miles east of the project site.

The direct loss of habitat acreage could potentially be mitigated by the staff's proposed management measures and acquisition of compensation habitat, but habitat loss and fragmentation and wildlife corridor impacts are concerns that are likely to be cumulatively considerable, depending on the location, quality, and quantity of compensation lands acquired by the applicant in order to comply with federal and state Endangered Species Act requirements. Because of the projected development in the project region, addressing cumulative impacts is particularly significant for this and future projects.

Agencies responsible for permitting solar projects in the Carrizo Plain and the wildlife agencies have initiated a multi-applicant (Ausra, Optisolar, SunPower) process to identify, model, and analyze the potential impacts of these proposed solar projects on habitat loss and wildlife movement. The agencies will use existing land-use, habitat, and wildlife data to establish a model of existing baseline conditions, and then use this wildlife corridor model to assess the potential direct and cumulative impacts of these projects on wildlife movement. Once the cumulative impacts of these projects on habitat and wildlife movement are identified, mitigation measures to address those impacts will be developed. The corridor modeling process would allow for scenario testing of those potential mitigation measures to ensure that cumulative corridor impacts and cumulative habitat loss impacts would be fully mitigated.

The wildlife corridor modeling process will occur soon, and may determine that additional compensation is necessary to mitigate for cumulative impacts beyond the appropriate habitat compensation for the project site and laydown area to mitigate for direct impacts to San Joaquin kit fox and other sensitive wildlife species, and the compensation lands required to mitigate for corridor impacts. The wildlife corridor modeling process will likely result in suggested mitigation measures beyond just the acquisition and protection of habitat compensation lands, as the Carrizo Plain is geographically constrained, and there may not be enough land available to compensate for the 14 square miles of habitat loss that would result from the construction of currently proposed solar projects. The Final Staff Assessment will include appropriate mitigation measures to ensure that all impacts to biological resources from development of the CESF are fully mitigated.

COMPLIANCE WITH LORS

Staff's conditions of certification address compliance with applicable LORS, including the California Endangered Species Act, federal Endangered Species Act, and the San Luis Obispo County General Plan. The following table provides a discussion of LORS for the CESF project.

Biological Resources Table 3
Laws, Ordinances, Regulations, and Standards Compliance

Federal	LORS Compliance
Federal Endangered Species Act	Unresolved – Appropriate habitat and wildlife corridor compensation has not yet been identified and approved by USFWS.
Migratory Bird Treaty Act	Yes – if the applicant installs temporary barrier fencing around burrowing owl burrows and bird nests during construction.
Clean Water Act	Yes – if Section 401 and 404 permits are obtained.
Fish and Wildlife Coordination Act	Yes –Section 7 consultation between the USACE and USFWS is occurring.
Fish and Wildlife Conservation Act	Unresolved – Appropriate habitat and wildlife corridor compensation has not yet been identified and approved by USFWS.

State	LORS Compliance
California Endangered Species Act of 1984	Unresolved – Appropriate habitat and wildlife corridor compensation has not yet been identified and approved by CDFG.
Fully Protected Species	Unresolved – While blunt-nosed leopard lizards are not present on the project site, potential impacts to California condor are still being assessed and mitigation may be necessary.
Nest or Eggs	Yes – if the applicant installs temporary barrier fencing around burrowing owl burrows and bird nests.
Migratory Birds	Yes – if the applicant installs temporary barrier fencing around burrowing owl burrows and bird nests.
California Environmental Quality Act (CEQA)	Unresolved – corridor impacts and habitat compensation have yet to be determined.
Native Plant Protection Act of 1977	Unresolved – rare plant mitigation measures and 2009 survey results will be necessary.
California Species Preservation Act of 1970	Unresolved – Appropriate habitat and wildlife corridor compensation has not yet been identified and approved by CDFG.

California Native Species Conservation and Enhancement Act	Unresolved – Appropriate habitat and wildlife corridor compensation has not yet been identified and approved by CDFG.

Local	LORS Compliance
San Luis Obispo County General Plan	Unresolved – Appropriate habitat and wildlife corridor compensation has not yet been identified and approved.

PUBLIC AND AGENCY COMMENTS

- CDFG – The comment letter from CDFG dated March 26, 2008, described concern with the adequacy of the biological surveys conducted by the applicant in 2007, and recommended additional surveys to determine the biological resources present on the project site. The comment letter stated that a habitat compensation ratio of at least 4:1 would be appropriate for this project. Additionally, the comment letter listed several species known to occur in the project area that the applicant's biological studies did not address.
- San Luis Obispo County – The County commented on the need to consult with CDFG and USFWS regarding species presence and the course of action for regarding the potential for blunt-nosed leopard lizard. The county also included information regarding its existing kit fox mitigation procedures.
- Local Residents – Several local residents have included comments relating to biological resources in their comments on the project. Their concerns include the potential for the project to impact kit fox, pronghorn, tule elk, raptors, and the regional conservation of biological resources.

NOTEWORTHY PUBLIC BENEFITS

Biological resources staff does not believe that the CESF project has any noteworthy public benefits related to biological resources.

CONCLUSIONS

Staff's proposed conditions of certification are necessary to mitigate impacts to biological resources from the project to less than significant levels. Clearing of the project site and construction of the power plant would result in significant impacts to special-status wildlife and plants that must be mitigated. Staff is unable to conclude whether impacts to biological resources during construction and operation of CESF would be mitigated to less than significant levels since staff lacks sufficient information to complete its analysis. Staff is also unable to determine whether the project would conform with all applicable LORS.

Staff will be working with the applicant, CDFG, USFWS, and the county to resolve any outstanding information needs. Modifications to the applicant's proposed mitigation may be necessary based on the USFWS Biological Opinion and CDFG concurrence and

Incidental Take Permit. Additional conditions of certification or modifications to currently proposed conditions of certification are likely to be necessary based on further consultation with agency personnel and information provided prior to completion of staff's Final Staff Assessment (FSA). For staff to complete the FSA, the following information is needed:

- Compliance with all applicable LORS remains an unresolved issue, particularly regarding sensitive species impacts and mitigation.
- The potential for California condor to be reintroduced to the project area is unclear, and staff will be working closely with CDFG and USFWS to understand the plans for the condor, and to assess the impacts of the proposed CESF on the condor and other avian species.
- The multi-agency wildlife corridor analysis effort has begun, and will develop a wildlife corridor model that will represent baseline conditions, allowing the potential impact of the project to be assessed. Potential mitigation designs will be modeled as well, to ensure that with the implementation of appropriate mitigation the construction of the CESF will not impair the function of wildlife corridors. The results of this corridor modeling will likely result in additional mitigation measures and possibly new conditions of certification to be incorporated in the FSA.
- The applicant needs to discuss potential habitat compensation options with Energy Commission staff, CDFG, USFWS, and San Luis Obispo County. Additional mitigation measures in combination with habitat compensation may be necessary to fully mitigate the direct and cumulative impacts of the proposed CESF. The large scale of the proposed CESF may require a regional perspective for implementation of mitigation measures, including potential actions at the Carrizo Plain National Monument or other areas of regional importance to sensitive biological resources.

PROPOSED CONDITIONS OF CERTIFICATION

Designated Biologist Selection

BIO-1 The project owner shall assign a Designated Biologist to the project. The project owner shall submit the resume of the proposed Designated Biologist, with at least 3 references and contact information, to the Energy Commission Compliance Project Manager (CPM) for approval.

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; and
3. At least one year of field experience with biological resources found in or near the project area.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM, that the proposed Designated Biologist or alternate

has the appropriate training and background to effectively implement the Conditions of Certification.

Verification: The project owner shall submit the specified information at least 90 days prior to the start of any site (or related facilities) mobilization. No site or related facility activities 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 ten working days prior to 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 for consideration.

Designated Biologist Duties

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist may be assisted by the approved Biological Monitor(s), but remains the contact for the project owner and CPM.

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 wetlands and 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 Report; and

9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and all permits.

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 activities. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties are ceased as approved by the CPM.

Biological Monitor Qualifications

BIO-3 The project owner's CPM-approved Designated Biologist shall submit the resume, at least 3 references, and contact information of the proposed Biological Monitors to the CPM for approval. The resume shall demonstrate, to the satisfaction of the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks.

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the Conditions of Certification, BRMIMP, WEAP, and all permits.

Verification: The project owner shall submit the specified information to the CPM for approval at least 30 days prior to the start of any project-related ground disturbance activities. The Designated Biologist shall submit a written statement to the CPM confirming that individual Biological Monitor(s) have 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 for approval no less than ten days prior to their first day of monitoring activities.

Designated Biologist and Biological Monitor Authority

BIO-4 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.

If required by the Designated Biologist and Biological Monitor(s) the project owner's construction/operation manager shall halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist.

The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;

2. Inform the project owner and the construction/operation manager when to resume activities; and

3. Notify the CPM if there is a halt of any activities and advise the CPM of any corrective actions that have been taken or will be instituted as a result of the work stoppage.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM immediately (and no later than the following morning of the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify the CPM of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the project owner, a determination of success or failure will be made by the CPM within five working days after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

Worker Environmental Awareness Program (WEAP)

BIO-5 The project owner shall develop and implement a CPM-approved WEAP in which each of its employees, as well as employees of contractors and subcontractors who work on the project site or any related facilities during site mobilization, ground disturbance, grading, construction, operation, and closure are informed about sensitive biological resources associated with the project.

The WEAP must:

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 is made available to all participants;

2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas;

3. Present the reasons for protecting these resources;

4. Present the meaning of various temporary and permanent habitat protection measures;

5. Identify whom to contact if there are further comments and questions about the material discussed in the program; and

6. 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 60 days prior to the start of any project-related ground disturbance activities, the project owner shall provide to the CPM the proposed 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 ten days prior to site and related facilities mobilization submit two copies of the CPM-approved materials.

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.

During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP)

BIO-6 The project owner shall submit two copies of the proposed Biological Resources Mitigation Implementation and monitoring Plan (BRMIMP) to the CPM (for review and approval) and to CDFG and USFWS (for review and comment) and shall implement the measures identified in the approved BRMIMP. The BRMIMP shall be prepared in consultation with the Designated Biologist and shall identify:

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 resources mitigation, monitoring, and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion, USACE 404 Permit, CDFG Streambed Alteration Agreement and Incidental Take Permit;

4. All biological resources mitigation, monitoring, and compliance measures required in local agency permits, such as site grading and landscaping requirements;

5. All sensitive biological resources to be impacted, avoided, or mitigated by project construction and operation;

6. All required mitigation measures for each sensitive biological resource;

7. Required habitat compensation strategy, including provisions for acquisition, enhancement, and management for any temporary and permanent loss of sensitive biological resources;

8. A detailed description of measures that shall be taken to avoid or mitigate temporary disturbances from construction activities;

9. All locations, on a map at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction;

10. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities - one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction. Include planned timing of aerial photography and a description of why times were chosen;

11. Duration for each type of monitoring and a description of monitoring methodologies and frequency;

12. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;

13. All performance standards and remedial measures to be implemented if performance standards are not met;

14. A process for proposing plan modifications to the CPM and appropriate agencies for review and approval; and

15. A copy of all biological resources-related permits obtained.

Verification: The project owner shall provide the draft BRMIMP at least 60 days prior to start of any project-related ground disturbance activities.

The CPM, in consultation with the USFWS, CDFG, and any other appropriate agencies, will determine the BRMIMP's acceptability within 45 days of receipt. If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to the CPM and the USFWS within five (5) days of their receipt and the BRMIMP shall be revised or supplemented to reflect the permit condition within 10 days of their receipt by the project owner. Ten days prior to site and related facilities mobilization the revised BRMIMP shall be resubmitted to the CPM.

The project owner shall notify the CPM no less than five working days before implementing any modifications to the approved BRMIMP to obtain CPM approval. Any changes to the approved BRMIMP must also be approved by the CPM and submitted to the USFWS and CDFG to ensure no conflicts exist.

Implementation of BRMIMP measures will be reported in the Monthly Compliance Reports by the Designated Biologist (i.e. survey results, construction activities that were monitored, species observed). Within thirty (30) days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction closure report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the

project's site mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.

Impact Avoidance Mitigation Features

BIO-7 Any time the project owner modifies or finalizes the project design they shall incorporate all feasible measures that avoid or minimize impacts to the local biological resources: (*typical measures are*)

1. Design, install, and maintain transmission line poles, access roads, pulling sites, and storage and parking areas to avoid identified sensitive resources;

2. Design, install, and maintain transmission lines and all electrical components in accordance with the Avian Power Line Interaction Committee (APLIC), *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* to reduce the likelihood of electrocutions of large birds;

3. Design, install, and maintain transmission lines and all electrical components in accordance with the APLIC *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* to reduce the likelihood of bird collisions;

4. Eliminate any California Exotic Pest Plants of Concern (CalEPPC) List A species from landscaping plans; and

5. Design, install, and maintain facility lighting to prevent side casting of light towards wildlife habitat.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures will be reported in the Monthly Compliance Reports by the Designated Biologist. Within thirty (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.

Mitigation Management to Avoid Harassment or Harm

BIO-8 The project owner shall implement the following measures to manage their construction site and related facilities in a manner to avoid or minimize impacts to local biological resources:

1. Install temporary fencing and provide wildlife escape ramps for construction areas that contain steep walled holes or trenches if outside of an approved, permanent exclusionary fence. The temporary fence shall be made of materials that are approved by USFWS and CDFG;

2. Conduct maintenance monitoring of permanent exclusion fencing on a monthly basis and complete repairs within one week of problem identification. Temporary fencing must be installed at any gaps if it shall remain open over night. Submit records of all monitoring dates, identify

repair locations, and corrective actions in the Monthly Compliance Report and Annual Compliance Report;

3. Make certain all food-related trash is disposed of in closed containers and removed at least once a week;

4. Prohibit feeding of wildlife by all workers;

5. Prohibit non-security-related firearms or weapons from being brought to the site;

6. Prohibit pets from being brought to the site;

7. Report all deaths of sensitive species to the appropriate project representative. Injured animals shall be reported to CDFG and USFWS, and the project owner shall follow instructions that are provided by CDFG; and

8. Minimize use of rodenticides and herbicides in the project area and prohibit the use of chemicals and pesticides known to cause harm to amphibians.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures will be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

Nesting or Migratory Bird Surveys and Impact Avoidance

BIO-9 The project owner shall implement the following measures to avoid or minimize impacts to nesting birds:

1. If ground disturbance activities will occur during the nesting season (generally February 1 – August 31) of birds potentially inhabiting the power plant site, such as loggerhead shrike, survey for nesting birds in the project area 30 days prior to the start of initial ground disturbance activities to assess presence and need for mitigation.

2. Complete a pre-construction survey for other nesting birds in the remainder of the project area (e.g., linear facilities) in the spring and no less than 30 days prior to the start of initial ground disturbance activities.

3. If active, occupied nests are found, schedule work outside nesting periods or prohibit work within 500 feet of raptor nests or 200 feet of other species' nests.

Verification: At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM with the final version of the BRMIMP,

which includes nesting bird survey results and a discussion of any necessary impact avoidance measures.

Burrowing Owl Impact Avoidance and Minimization Measures

BIO-10 The project owner shall implement the following measures for the burrowing owl:

1. Complete a pre-construction survey for burrowing owls on the project site and linear facilities no less than 30 days prior to the start of any project-related ground disturbance activities. If burrowing owls are present within 500 feet of the project site or linear facilities, then the CDFG Burrowing Owl Mitigation Guidelines (1995) shall be implemented;

2. Monitor burrowing owl pairs within 500 feet of any activities that exceed ambient noise and/or vibration levels;

3. Establish a 500-foot set back from any active burrow and construct additional noise/visual barriers (e.g., haystacks or plywood fencing) to shield the active burrow from construction activities. Post signs (in both English and Spanish) designating presence of sensitive area;

4. Consult with CDFG to determine compensation ratio(s) for direct loss of nesting and foraging habitat;

5. If one-way doors are used to exclude burrowing owls, the burrows shall be monitored and hand excavated to ensure the individual has evacuated the burrow prior to ground disturbing activities; and

6. If a burrowing owl is occupying an active burrow within the project site or linear facilities and requires passive relocation, mitigation in the form of artificial burrows should be mitigated at a 2:1 ratio. Newly constructed artificial burrows should be installed in an adjacent protected area that provides a minimum of 6.5 acres per pair or solitary owl around the site (CDFG 1995, 2006). Construction and installation of burrows should be done in consultation with CDFG.

Verification: The project owner shall submit a report to CDFG and USFWS at least 14 days prior to the start of project-related ground disturbance activities that describes when burrowing owl surveys were completed, what was observed, and suggested mitigation measures. If artificial burrows need to be installed, the project owner shall coordinate with and report to CDFG on the number of new burrows, their locations, and how burrowing owls will be protected for the life of the project. The end-of-construction report shall be provided to the CPM, CDFG, and USFWS at least 30 days prior to the start of commercial operation.

Rare Plant Survey and Mitigation Plan

BIO-11 A qualified botanist shall survey for rare plants on the power plant site in the spring of 2009, (and other appropriate identification periods if needed) according to the CDFG's Botanical Survey Guidelines. If no rare plants are

found, the botanist shall provide survey data to Energy Commission staff and CDFG, and no further mitigation will be required.

If any rare plants, especially the pale-yellow tidy-tips found in 2008 surveys, are found in 2009, the following measures shall be implemented:

1. If the plants can be avoided, they will be clearly marked in the field by a qualified botanist for avoidance during construction activities; or

2. If rare plants are found and cannot be avoided, collect seed and develop a mitigation plan in consultation with CDFG and the Energy Commission staff within 45 days to use the collected seed to establish a population on protected habitat compensation lands; and

3. Incorporate the mitigation plan into the final BRIMIMP.

Verification: The project owner shall perform a 2009 spring survey for rare plants. The survey results shall be provided to CDFG and Energy Commission staff within one week. A rare plant mitigation plan shall be prepared for CDFG and Energy Commission staff review within two weeks following completion of the surveys. The final mitigation plan shall be approved by the CPM and CDFG, incorporated into the BRMIMP, and implemented.

CDFG Incidental Take Permit

BIO-12 The project owner shall acquire an Incidental Take Permit from the California Department of Fish and Game (CDFG) and incorporate the terms and conditions into the project's BRMIMP.

Verification: At least 30 days prior to the start of any project-related ground disturbance activities, the project owner shall submit to the CPM a copy of the final CDFG Incidental Take Permit, incorporate the conditions of the Incidental Take Permit in to the BRMIMP, and implement them.

CDFG Streambed Alteration Agreement

BIO-13 The project owner shall acquire a Streambed Alteration Agreement from the CDFG (per Section 1600 of the Fish and Game Code), and incorporate the biological resource related terms and conditions into the project's BRMIMP.

Verification: At least 30 days prior to the start of any project-related ground disturbance activities, the project owner shall submit to the CPM a copy of the final CDFG Streambed Alteration Agreement, incorporate the conditions of the agreement into the BRMIMP, and implement them.

Regional Water Quality Control Board Certification

BIO-14 The project owner shall acquire the Regional Water Quality Control Board Section 401 state Clean Water Act certification, or a waiver, and incorporate the biological resource related terms and conditions into the project's BRMIMP and implement them.

Verification: At least 30 days prior to the start of any project-related ground disturbance activities, the project owner shall provide the CPM with a copy of the final Regional Water Quality Control Board's certification and incorporate the terms and conditions in the BRMIMP and implement them.

USFWS Biological Opinion

BIO-15 The project owner shall provide a copy of the final Biological Opinion provided to the U.S. Army Corps of Engineers through Section 7 consultation of the federal Endangered Species Act with the U. S. Fish and Wildlife Service. The terms and conditions contained in the Biological Opinion shall be incorporated into the project's BRMIMP and implemented.

Verification: At least 30 days prior to the start of any project-related ground disturbance activities, the project owner shall submit to the CPM a copy of the U. S. Fish and Wildlife Service's Biological Opinion.

U. S. Army Corps of Engineers Section 404 Permit

BIO-16 The project owner shall provide a copy of the final Nationwide Permit U.S. Army Corps of Engineers Section 404 of the federal Clean Water Act permit. The biological resources related terms and conditions contained in the permit shall be incorporated into the project's BRMIMP and implemented.

Verification: At least 30 days prior to the start of any site or related facilities mobilization activities, the project owner shall submit to the CPM a copy of the U.S. Army Corps of Engineers permit.

San Joaquin Kit Fox, American Badger, Pallid Bat, and Burrowing Owl Habitat Compensation

BIO-17 To compensate for temporary and permanent impacts to San Joaquin kit fox, American badger, pallid bat, burrowing owl, their habitat and wildlife corridors, the project owner shall implement a habitat compensation strategy that guarantees the perpetual care of an appropriate amount of habitat in the region of the proposed project to fully mitigate the impacts of the CESF. The selected compensation land must be suitable for the special-status species as determined in consultation with the Energy Commission staff, CDFG, and USFWS. The project owner shall attempt to acquire parcels that are as contiguous as possible in a similar timeframe to avoid significantly separated parcels and "piecemeal" acquisition. This mitigation acreage shall not overlap with other previously planned compensation land requirements set aside for other projects. This habitat compensation land must provide a high level of wildlife corridor function, connecting the Carrizo Plain core population of kit fox with other kit fox populations.

The resulting landscape must function at a level comparable to existing conditions. Enhancement must increase the productivity of remaining habitat such that the target species populations are not diminished by the proposed project's habitat losses.

In addition to the habitat compensation lands, the project owner must provide funds for use as principal for a permanent, non-wasting capital endowment. The endowment amount shall be determined through a PAR analysis. Interest from this amount shall be available for the operation, management and protection of the habitat compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action designed to protect or improve the habitat values of the habitat compensation lands. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the CPM, in consultation with CDFG, to ensure the continued viability of the species on the habitat compensation lands. The CPM, in consultation with CDFG, will decide how the funds will be spent.

Verification: No later than 12 months following the publication of the Energy Commission Decision, the project owner will provide written verification to the CPM that the habitat compensation purchase has been completed. Concurrently, the project owner will provide a certified check to establish the endowment and any necessary habitat protection and restoration activities, if required, to the approved third party or CDFG and written verification to the CPM that the check has been provided. Within six months of the land purchase (as determined by the date on title), the project owner shall provide the CPM a management plan for the habitat compensation lands and associated endowment funds for review and approval in consultation with CDFG and USFWS.

Wildlife Corridor Impact Mitigation Plan

BIO-18 The project owner shall participate in the multi-agency collaborative process with the USFWS, CDFG, San Luis Obispo County, and Energy Commission staff to model the proposed project, existing land uses, habitat types, and known wildlife movements for the focal species of San Joaquin kit fox, pronghorn, and tule elk. This corridor modeling will be conducted so that baseline conditions, potential projects, and proposed mitigation can all be evaluated to ensure that all impacts are identified and fully mitigated.

The impact analysis and mitigation must consider the potential impacts to the corridor and corridor functions. Potential corridor impacts to be evaluated should include, but not be limited to, loss of prey base and refugia for immigrating, emigrating, and dispersing individuals, reduced capacity for individuals to reside in the corridor, reduced genetic flow, increased predation resulting from impermeable fences (blocked escape routes), increased exposure to predation due to night lighting, increased exposure to traffic on the highway due to the impermeable fence, reduced corridor width, and increased animal/vehicle traffic collisions due to traffic increases.

Mitigation for impacts to wildlife corridors may require conservation and enhancement of remaining undeveloped lands within the corridor, the use of conservation easements, and the protection of habitat patches at the entrances and exits of the wildlife corridors. Some of these conservation easements may allow or encourage existing land uses that benefit wildlife, such as dryland farming, to continue, while prohibiting conversion of the

easement lands to uses with no benefit to wildlife. Other potential wildlife corridor mitigation may include replacement of fencing to allow passage of pronghorn, the construction of pronghorn fence crossings, or other measures yet to be developed.

The project owner shall develop and implement a wildlife corridor mitigation plan in coordination with the Energy Commission staff, USFWS, CDFG, and San Luis Obispo County. The project owner shall provide habitat compensation through conservation easements or fee simple ownership to fully mitigate this project's contribution to the cumulative reduction in wildlife habitat connectivity resulting from the present and foreseeable future projects. Compensation lands shall be configured and managed such that habitat connectivity within remaining San Joaquin kit fox, pronghorn, and tule elk (target species) habitat is not diminished when compared to current conditions. Wildlife corridor compensation requirements would not be considered additive to habitat compensation described in BIO-17, above, as long as the habitat compensation can be accomplished within and adjacent to the corridor chokepoint. The wildlife corridor mitigation shall provide the following, in perpetuity:

1. **Viable pronghorn crossing opportunities at Highway 58.** Features may include modified fences and designated crossing areas with crossing-event-triggered warning lights on Highway 58. Crossings shall be associated with conserved habitat.

2. **Enhanced habitat values within the remaining corridor.** The resulting chokepoint shall be conserved and managed to provide habitat connectivity and population functions that are comparable to the existing Carrizo Plain landscape (baseline conditions). The chokepoint must function at a level comparable to the existing width of the Carrizo Plain.

3. **Enhanced habitat at the north and south ends of the chokepoint.** Conservation and management shall enhance habitat patches at the north and south ends of the chokepoint to increase and maintain its viability as a wildlife corridor.

The wildlife corridor impact and mitigation analysis may reveal additional corridor functions that require mitigation.

Verification: The applicant will work with CDFG, USFWS, San Luis Obispo County, and the Energy Commission staff to create a wildlife corridor mitigation plan, which will be submitted to the wildlife agencies and Energy Commission staff for review and approval at least 120 prior to the start of any project-related ground disturbance activities. The wildlife corridor mitigation plan shall include mitigation maintenance, monitoring, and reporting requirements, so that the success of the mitigation measures can be measured, monitored, and reported to CDFG, USFWS, San Luis Obispo County, and Energy Commission staff to ensure the ongoing functionality of wildlife corridors in the project vicinity.

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ACRONYMS LIST

AFC	Application for Certification
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESF	Carrizo Energy Solar Farm
CNDDB	California Natural Diversity Database
CPM	Compliance Project Manager
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
LORS	Laws Ordinances Regulations and Standards
NCCP	Natural Community Conservation Plan
PG&E	Pacific Gas and Electric
RWQCB	Regional Water Quality Control Board
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WEAP	Worker Environmental Awareness Program

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APPENDIX A: Kit Fox Evaluation Forms

Kit Fox Habitat Evaluation Form

(guidelines)

Cover Sheet

Project Name Carrizo Energy Solar Farm (CESF)

Date 1.14.08

Project Location* Immediately north and south of SR58 in San Luis Obispo County near the towns of Simmler and California Valley.

*Include project vicinity map and project boundary on copy of U.S.G.S. 7.5 minute map (size may be reduced)

U.S.G.S. Quad Map Name
La Panza NE and California Valley; Sections 28 and 33

Lat/Long or UTM coordinates (if available)

Project Description:

Project Size 1,020 **Acres** **Amount of Kit Fox Habitat Affected** 1,020 **Acres** (640 permanent 380 temporary)

Quantity of WHR Habitat Types Impacted (i.e. - 2 acres annual grassland, 3 acres blue oak woodland)

WHR type Pasture 1,020 Acres

WHR type _____ _____ Acres

WHR type _____ _____ Acres

WHR type _____ _____ Acres

Comments: The entire site is marginal kit fox habitat that is chronically disturbed rangeland. Disking & grazing of the site is done on a regular basis. Most recent was January 2008.

Form Completed By: Theresa Miller - URS

Rev 3/02
G:envdiv/forms/kit fox habitat

San Joaquin Kit Fox Habitat Evaluation form

Is the project area within 10 miles of a recorded San Joaquin kit fox observation or within contiguous suitable habitat as defined in question 2 (A-E)

Yes - Continue with evaluation form
No - Evaluation form/surveys are not necessary

1. Importance of the project area relative to Recovery Plan for Upland Species of the San Joaquin Valley, California (Williams et al., 1998)

   A. Project would block or degrade an existing corridor linking core populations or isolate a subpopulation (20)
   B. Project is within core population (15)
   C. Project area is identified within satellite populations (12)
   D. Project area is within a corridor linking satellite populations (10)
   E. Project area is not within any of the previously described areas but is within known kit fox range (5)

2. Habitat characteristics of project area.

   A. Annual grassland or saltbush scrub present >50% of site (15)
   B. Grassland or saltbush scrub present but comprises<50% of project area (10)
   C. Oak savannah present on >50% of site (8)
   D. Fallow ag fields or grain/alfalfa crops (7)
   E. Orchards/vineyards (5)
   F. Intensively maintained row crops or suitable vegetation absent (0)

3. Isolation of project area.

   A. Project area surrounded by contiguous kit fox habitat as described in Question 2a-e (15)
   B. Project area adjacent to at least 40 acres of contiguous habitat or part of an existing corridor (10)
   C. Project area adjacent to <40 acres of habitat but linked by existing corridor (i.e., river, canal, aqueduct) (7)
   D. Project area surrounded by ag but less than 200 yards from habitat (5)

E. Project area completely isolated by row crops or development and is greater than 200 yards from potential habitat (0)

4. Potential for increased mortality as a result of project implementation. Mortality may come from direct (e.g., - construction related) or indirect (e.g., - vehicle strikes due to increases in post development traffic) sources.

A. Increased mortality likely (10)
B. Unknown mortality effects (5)
C. No long term effect on mortality (0)

* Mortality potential would remain the same as current potential from road kill. BMPs during constructio will minimize potential.

Revised 03-02

5. Amount of potential kit fox habitat affected.

A. >320 acres (10)
B. 160 - 319 acres (7)
C. 80 - 159 acres (5)
D. 40 - 79 acres (3)
E. < 40 acres (1)

* Marginal habitat w/ transient individuals detected. No sheltering habitat observed.

6. Results of project implementation.

A. Project site will be permanently converted and will no longer support foxes (10) 640 acres perm
B. Project area will be temporarily impacted but will require periodic disturbance for ongoing maintenance (7) -380 acres temporary
C. Project area will be temporarily impacted and no maintenance necessary (5)
D. Project will result in changes to agricultural crops (2)
E. No habitat impacts (0)

* No sheltering habitat present.

7. Project Shape

A. Large Block (10)
B. Linear with > 40 foot right-of-way (5)
C. Linear with < 40 foot right-of-way (3)

8. Have San Joaquin kit foxes been observed within 3 miles of the project area within the last 10 years?

A. Yes (10)
B. No (0)

Scoring

1. Recovery importance 5
2. Habitat condition Ø

3.	Isolation	Ø
4.	Mortality	5
5.	Quantity of habitat impacted	10
6.	Project results	10
7.	Project shape	10
8.	Recent observations	10
TOTAL		50

Revised 03/02-lpd

Kit Fox Habitat Evaluation Form

(guidelines)

Cover Sheet

Project Name Carrizo Energy Solar Farm

Date 8/4/2008

Project Location* Construction laydown area, west and south of SR-58

*Include project vicinity map and project boundary on copy of U.S.G.S. 7.5 minute map (size may be reduced)

U.S.G.S. Quad Map Name
California Valley

Lat/Long or UTM coordinates (if available)

Project Description:

Project Size 380 **Acres** **Amount of Kit Fox Habitat Affected** 380 **Acres**

Quantity of WHR Habitat Types Impacted (i.e. - 2 acres annual grassland, 3 acres blue oak woodland)

WHR type Cropland 380 Acres

WHR type _____ _____ Acres

WHR type _____ _____ Acres

WHR type _____ _____ Acres

Comments:

Form Completed By: Brian McCollough, Energy Comm.
Dave Hacker, CDFG

Rev 3/02
G:envdiv/forms/kit fox habitat

San Joaquin Kit Fox Habitat Evaluation form

Is the project area within 10 miles of a recorded San Joaquin kit fox observation or within contiguous suitable habitat as defined in question 2 (A-E)

Yes - Continue with evaluation form
No - Evaluation form/surveys are not necessary

1. Importance of the project area relative to Recovery Plan for Upland Species of the San Joaquin Valley, California (Williams et al., 1998)

YES A. Project would block or degrade an existing corridor linking core populations or isolate a subpopulation (20)
B. Project is within core population (15)
C. Project area is identified within satellite populations (12)
D. Project area is within a corridor linking satellite populations (10)
E. Project area is not within any of the previously described areas but is within known kit fox range (5)

2. Habitat characteristics of project area.

A. Annual grassland or saltbush scrub present >50% of site (15)
B. Grassland or saltbush scrub present but comprises<50% of project area (10)
C. Oak savannah present on >50% of site (8)
YES D. Fallow ag fields or grain/alfalfa crops (7)
E. Orchards/vineyards (5)
F. Intensively maintained row crops or suitable vegetation absent (0)

3. Isolation of project area.

YES A. Project area surrounded by contiguous kit fox habitat as described in Question 2a-e (15)
B. Project area adjacent to at least 40 acres of contiguous habitat or part of an existing corridor (10)
C. Project area adjacent to <40 acres of habitat but linked by existing corridor (i.e., river, canal, aqueduct) (7)
D. Project area surrounded by ag but less than 200 yards from habitat (5)

E. Project area completely isolated by row crops or development and is greater than 200 yards from potential habitat (0)

4. Potential for increased mortality as a result of project implementation. Mortality may come from direct (e.g., - construction related) or indirect (e.g., - vehicle strikes due to increases in post development traffic) sources.

YES A. Increased mortality likely (10)
B. Unknown mortality effects (5)
C. No long term effect on mortality (0)

Revised 03-02

5. Amount of potential kit fox habitat affected.

YES A. >320 acres (10)
B. 160 - 319 acres (7)
C. 80 - 159 acres (5)
D. 40 - 79 acres (3)
E. < 40 acres (1)

6. Results of project implementation.

A. Project site will be permanently converted and will no longer support foxes (10)
B. Project area will be temporarily impacted but will require periodic disturbance for ongoing maintenance (7)
YES C. Project area will be temporarily impacted and no maintenance necessary (5)
D. Project will result in changes to agricultural crops (2)
E. No habitat impacts (0)

7. Project Shape

YES A. Large Block (10)
B. Linear with > 40 foot right-of-way (5)
C. Linear with < 40 foot right-of-way (3)

8. Have San Joaquin kit foxes been observed within 3 miles of the project area within the last 10 years?

YES A. Yes (10)
B. No (0)

Scoring

1. Recovery importance A 20
2. Habitat condition D 7

3.	Isolation	A	15
4.	Mortality	A	10
5.	Quantity of habitat impacted	A	10
6.	Project results	C	5
7.	Project shape	A	10
8.	Recent observations	A	10

TOTAL 87

Revised 03/02-lpd

Kit Fox Habitat Evaluation Form

(guidelines)

Cover Sheet

Project Name Carrizo Energy Solar Farm

Date 8/6/08
completed w/ CDFG

Project Location* Solar facility north of SR-58, west of Tracy Lane

*Include project vicinity map and project boundary on copy of U.S.G.S. 7.5 minute map (size may be reduced)

U.S.G.S. Quad Map Name
La Panza NE and California Valley

Lat/Long or UTM coordinates (if available)

_____

Project Description:

Project Size 640 **Acres** **Amount of Kit Fox Habitat Affected** 640 **Acres**

Quantity of WHR Habitat Types Impacted (i.e. - 2 acres annual grassland, 3 acres blue oak woodland)

WHR type Annual Grassland 640 Acres

WHR type _____ _____ Acres

WHR type _____ _____ Acres

WHR type _____ _____ Acres

Comments: _____

_____

Form Completed By: Brian McCollough, Energy Comm.
Dave Hacker, CDFG

Rev 3/02
G:envdiv/forms/kit fox habitat

San Joaquin Kit Fox Habitat Evaluation form

Is the project area within 10 miles of a recorded San Joaquin kit fox observation or within contiguous suitable habitat as defined in question 2 (A-E)

Yes - Continue with evaluation form
No - Evaluation form/surveys are not necessary

1. Importance of the project area relative to Recovery Plan for Upland Species of the San Joaquin Valley, California (Williams et al., 1998)

YES A. Project would block or degrade an existing corridor linking core populations or isolate a subpopulation (20)
B. Project is within core population (15)
C. Project area is identified within satellite populations (12)
D. Project area is within a corridor linking satellite populations (10)
E. Project area is not within any of the previously described areas but is within known kit fox range (5)

2. Habitat characteristics of project area.

A. Annual grassland or saltbush scrub present >50% of site (15)
B. Grassland or saltbush scrub present but comprises<50% of project area (10)
C. Oak savannah present on >50% of site (8)
YES D. Fallow ag fields or grain/alfalfa crops (7)
E. Orchards/vineyards (5)
F. Intensively maintained row crops or suitable vegetation absent (0)

3. Isolation of project area.

YES A. Project area surrounded by contiguous kit fox habitat as described in Question 2a-e (15)
B. Project area adjacent to at least 40 acres of contiguous habitat or part of an existing corridor (10)
C. Project area adjacent to <40 acres of habitat but linked by existing corridor (i.e., river, canal, aqueduct) (7)
D. Project area surrounded by ag but less than 200 yards from habitat (5)

E. Project area completely isolated by row crops or development and is greater than 200 yards from potential habitat (0)

4. Potential for increased mortality as a result of project implementation. Mortality may come from direct (e.g., - construction related) or indirect (e.g., - vehicle strikes due to increases in post development traffic) sources.

YES A. Increased mortality likely (10)
B. Unknown mortality effects (5)
C. No long term effect on mortality (0)

Revised 03-02

5. Amount of potential kit fox habitat affected.

YES A. >320 acres (10)
B. 160 - 319 acres (7)
C. 80 - 159 acres (5)
D. 40 - 79 acres (3)
E. < 40 acres (1)

6. Results of project implementation.

YES A. Project site will be permanently converted and will no longer support foxes (10)
B. Project area will be temporarily impacted but will require periodic disturbance for ongoing maintenance (7)
C. Project area will be temporarily impacted and no maintenance necessary (5)
D. Project will result in changes to agricultural crops (2)
E. No habitat impacts (0)

7. Project Shape

YES A. Large Block (10)
B. Linear with > 40 foot right-of-way (5)
C. Linear with < 40 foot right-of-way (3)

8. Have San Joaquin kit foxes been observed within 3 miles of the project area within the last 10 years?

YES A. Yes (10)
B. No (0)

Scoring

1. Recovery importance A 20
2. Habitat condition D 7

3.	Isolation	A	15
4.	Mortality	A	10
5.	Quantity of habitat impacted	A	10
6.	Project results	A	10
7.	Project shape	A	10
8.	Recent observations	A	10

TOTAL 92

Revised 03/02-lpd

CULTURAL RESOURCES

Beverly E. Bastian and Carol Roland

SUMMARY OF CONCLUSIONS

Staff's cultural resources analysis has determined that the Carrizo Energy Solar Farm (CESF) project, proposed by Ausra CA II, LLC (Ausra) would have no impact on any known prehistoric archaeological sites, or on any known ethnographic resources, or on any individual built-environment resources, or on the Northern Carrizo Plain Cultural Landscape Historic District, with the adoption and implementation of Conditions of Certification **CUL-1** through **CUL-7**.

Staff, however, has identified a significant CESF project impact to two known, potentially California Register of Historical Resources (CRHR)-eligible, historic-period archaeological sites located on the project site parcel and the project laydown parcel, and subject to destruction to accommodate the project's use of the two parcels. The historic-period archaeological components at the King and Cavanaugh I farmsteads are the material remains of two examples of a unique lifestyle in California: early-to-mid-twentieth-century dryland farming and cattle ranching in a transportation-challenged area. Occupied from 1928 until circa1995, and from 1942 until circa 1995, the archaeological components at these farmsteads contain data that could be used to address research questions regarding the changing integration of Carrizo residents in the regional economy, as both producers and consumers during the mid-twentieth century, and regarding the unique adaptation of Carrizo residents to their arid and isolated environment. Staff has proposed a condition, **CUL-8**, requiring Ausra to carry out post-certification, pre-construction archaeological testing on these two sites, and additionally requiring data recovery as mitigation for their destruction by the project, if either or both prove to be CRHR eligible.

When properly implemented and enforced, staff believes that **CUL-1** through **CUL-8** would reduce to less than significant any impacts to both previously known and as-yet-to-be-identified CRHR-eligible cultural resources encountered during construction-related ground disturbance or operation. Additionally, with the adoption and implementation of these conditions, the proposed CESF project would be in conformity with all applicable LORS.

INTRODUCTION

This cultural resources assessment identifies the potential impacts of the CESF on cultural resources. Cultural resources are defined under state law as buildings, sites, structures, objects, and historic districts. Three kinds of cultural resources, classified by their origins, are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. Groupings of prehistoric resources are also recognized as districts and as ethnographic landscapes. In California, the prehistoric period began over 12,000 years

ago and extended through the eighteenth century, until 1769, when the first Europeans settled in California.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, Asian or Pacific Island immigrants. Groupings of ethnographic resources are also recognized as districts and as ethnographic landscapes. Ethnographic resources may include traditional resource-collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

Historic-period resources are those materials, archaeological and architectural, usually associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Groupings of historic-period resources are also recognized as historic districts and as historic vernacular landscapes. Under federal and state laws, historic cultural resources must be greater than fifty years old to be considered of potential historic importance. A resource less than fifty years of age may be historically important if the resource is of exceptional importance in history.

For the CESF project, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts from the proposed project using criteria from the California Environmental Quality Act (CEQA).

If cultural resources are identified, staff determines which are eligible for the CRHR and whether the CESF project would have a significant impact on those that are CRHR eligible. If significant project impacts to CRHR-eligible cultural resources cannot be avoided, staff recommends mitigation measures to reduce significant impacts to CRHR-eligible cultural resources to less than significant.

Staff's primary concern is to ensure that all potentially CRHR-eligible cultural resources are identified, that all potential impacts are identified and assessed, and that conditions are proposed that ensure that all significant impacts are mitigated to a less-than-significant level.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Projects licensed by the Energy Commission are reviewed to ensure compliance with all applicable laws. For this project, in which there is no federal involvement,[1] the applicable laws are primarily state laws. Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies.

[1] Cultural resources in California are also protected under provisions of the federal Antiquities Act of 1906 (Title 16, United States Code, Section 431, et seq.) and subsequent related legislation, policies, and enacting responsibilities, e.g., federal agency regulations and guidelines for implementation of the Antiquities Act.

CULTURAL RESOURCES Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
State	
Public Resources Code 5097.98 (b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until he/she confers with the Native American Heritage Commission-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
California Health and Safety Code, Section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. This code also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Local	
County of San Luis Obispo Land Use Ordinance, Title 22, Section 01.010 (CESF2007a, p. 5.7-36)	Plan to protect and enhance significant natural, historic, archaeological (prehistoric only), and scenic resources in the county, as defined in the County General Plan.

SETTING

Information provided regarding the setting of the proposed project places it in its geographical and geological context and specifies the technical description of the project. Additionally, the archaeological, ethnographic, and historical background provides the context for the evaluation of the historical significance of any identified cultural resources within the project's impact area.

REGIONAL SETTING

The proposed project area is located in the northwestern portion of the Carrizo Plain, a narrow, southeast-northwest–trending, alluvial valley enclosed by mountains of the Coast Ranges geomorphic province. The valley, about 50 miles long and ranging between 10 and 15 miles wide, constitutes the Carrizo Plain physiographic sub-unit of that province. The Temblor Range bounds the Carrizo Plain to the northeast, the Caliente Range bounds it to the southwest, and the La Panza Range bounds it to the west. The run-off of precipitation from all these mountains flows into the plain, but has no exterior outlet, flowing instead to the lowest point in the valley, Soda Lake, which is located in the middle of the plain. The lake is alkaline, and its level and extent vary seasonally, rising with in-flow and falling with evaporation. The highest elevation on the plain is about 2,100 feet above mean sea level. The plain's soils consist entirely of alluvial deposits of interbedded gravel, sand, silt, and clay, up to several hundred feet in depth, originating in the surrounding mountains (CESF2007a, pp. 5.3-2–5.3-3). The

Carrizo Plain National Monument, a natural and cultural preserve consisting of 180,000 acres managed jointly by the Bureau of Land Management, the Nature Conservancy, and the California Department of Fish and Game, occupies the southern two-thirds of the plain (CESF2007a, p. 5.13-2). The privately-held portion of the plain, including the project area, is zoned for agricultural use in the San Luis Obispo County General Plan, but solar energy generation is an allowed use. Historically, the plain has been almost exclusively devoted to dry-land farming and grazing, with farm or ranch complexes sparsely scattered over the area (CESF2007a, p. 5.9-2; fig. 5.9-1).

VICINITY, SITE, AND PROJECT DESCRIPTION

The 640-acre plant site (the entirety of Section 28 of Township 29 South, Range 18 E) and the 380-acre laydown area proposed for the CESF are both mostly in pasture, and both have inactive farm complexes on them. The laydown parcel is located south of the proposed plant site, across State Highway 58. That highway forms the southern boundary of the proposed plant site. An unimproved road, Tracy Lane, forms the eastern boundary, while only fence lines mark the northern and western boundaries. On the proposed plant site the terrain slopes gently down to the southwest, with the elevation ranging from 2,014 feet, near the southwest corner, to 2,064 feet, near the northeast corner (CESF2007a, pp. 5.3-2–5.3-3). Both the project site and the laydown parcels were previously used for agricultural production, and Ausra's geotechnical study identified the uppermost 2–4 feet of the plant site's soils as having been disturbed by disking or other mechanical impacts (URS 2007b, pp. 2-1–2-2, 3-3). The land surrounding the proposed plant site is fallow farm and ranch land, except for a number of residential parcels along Highway 58. The nearest concentration of people is the unincorporated village of California Valley, about 1.5 miles to the southeast. Another small, nearby community is Simmler, about 2.5 miles east of the proposed plant site on Highway 58.

The proposed project uses the focused beams from arrays of sun-tracking mirrors to boil water to produce steam to drive two steam turbine generators (STGs) to produce a nominal 177 megawatts (MW) of electricity. With this project Ausra is introducing into this country a solar technology using a new proprietary form of mirror (Compact Linear Fresnel Reflector, or CLFR) and the innovation of using water as the medium for transferring heat to produce steam. Some of the project's construction and demolition activities that could affect cultural resources include (CESF2007a, pp. 3-5–3-27; table 3.4-1; CESF2008h, pp. 1-1–1-10; figs. 1.2-3, 1.4-1; pp. 2.7-1–2.7-5; CESF2008n, Data Responses 118 and 120):

- demolition of the existing ranch structures on the project site and laydown parcels;
- a one-square-mile solar field of 46,800 CLFRs, aligned on a north-south axis, each 7.5 feet wide, 8 feet tall, and 56 feet long;
- 195 receivers, each 56 feet tall and 1,268 feet long;
- two STGs, each enclosed in a building measuring 100 feet x 160 feet, and 40 feet tall;
- two 20-cell, air-cooled condensers, each measuring 170 feet x 249 feet, and 115 feet tall;

- an underground, 6-inch-diameter, 0.5-mile-long pipeline running from the well to the raw water storage tank, in a trench at least three feet deep;
- an underground sewer system septic tank, measuring 52 inches x 101 inches, and 66 inches tall;
- a sewer system leach field 70 feet x 200 feet, excavated to a depth of 14 feet;
- an 850-foot-long, 230-kV transmission line, extending from a new switchyard to the new PG&E 230-kV switching station, supported on five 115-foot-high steel poles, with footings excavated to some 30 feet;
- a new PG&E 230-kV switching station at the northern end of the power block area, including two 115-foot-high steel poles, with footings excavated to some 30 feet;
- two spans of interconnection transmission line, extending 90 feet outside of the project's northern boundary and looping from the new PG&E 230-kV switching station out to the Morro Bay-Midway 230-kV #1 and back to the switching station to interconnect the proposed project to the PG&E grid, each on a single pole.
- pulling sites for the installation of the conductors on the new interconnection line;
- gasoline and diesel bulk storage tank foundations in the laydown area, measuring 100 feet x 100 feet, excavated to a depth of 2 feet;
- two sets of bridge footings for permanent creek crossing in the laydown area, each measuring 130 feet x 140 feet, 4 feet tall, and excavated to a depth of 4 feet;
- perimeter 6.5-foot chain-link fencing of both the project site and the laydown area; and

The proposed project would deliver its generated power to the California electrical grid by interconnecting through the new PG&E 230-kV switching station, located in the northern part of the project power block (CESF2008h, p. 1-9). From there, an additional two short spans of transmission line would carry the power to Morro Bay-Midway 230-kV transmission line 1, which runs west-east just north of the northern boundary of the proposed project site.

Prehistoric Setting

Paleo-Indian Period (10,000 to 8,000 B.C.)

The earliest generally accepted evidence for the human occupation of the North American continent dates to about 10,000 years B.C. Known as the Paleoindian Period, this time was one of environmental transition between the late Pleistocene (advancing and retreating glaciations) and early Holocene (temperate, as at present) geological and climatic epochs. The climate of the Paleo-Indian Period had been characterized by increased rainfall and cooler temperatures, which formed deep lakes and marshes, even in the interior desert regions of California. As temperatures warmed with the start of the Holocene, sea levels rose as the glaciers slowly retreated. Paleoindian archaeological evidence occurs primarily in the form of large, very skillfully made stone spear points, sometimes in association with the bones of large game animals. This occupation is known as the Big Game Hunting Tradition, estimated to range in date between 10,000 and 9,000 B.C. The Big Game Hunting Tradition, centered in the Great

Plains and American Southwest, but evidenced all over the continent, apparently focused on the exploitation of now-extinct giant mammals (megafauna), such as mammoths, giant bison, and giant sloths. Big Game Hunting Tradition sites, however were often located near rivers, lakes, and marshes, where other food sources would have been abundant (Moratto 1984, p. 88). Archaeologists believe that California did not have the Big Game Hunting Tradition, although its characteristic fluted projectile points, of which the only variety seen in California is the Clovis point (Moratto 1984, p. 80), have been found all over the state. Rather, California's Late Pleistocene peoples were forced to adopt a general hunter-forager subsistence mode and to live near reliable water sources where food and plant resources were consistently available when the glaciers of the Pleistocene era retreated and the warmer and drier climate of the succeeding geological era, the Holocene, caused major environmental changes, including a rise in sea level along the coast, desiccation of the formerly plentiful inland lakes, and extinction of megafauna (Moratto 1984, pp. 78–81; Byrd and Raab 2007, p. 215). The closest known sites of this period to the Carrizo Plain, have been found near the old shorelines of Tulare Lake (CESF2007a, p. 4-1).

The Early Holocene Period (8,000 to 5,000 B.C.)

In the Early Holocene epoch, a new, prevailing hunting tradition emerged in California, known as the Western Pluvial Lakes Tradition, notably marked by a decrease in big-game hunting. Sites of the Western Pluvial Lakes Tradition were located on or near shorelines of bodies of fresh water and are estimated to range in date between 9,000 and 8,000 B.C. The Western Pluvial Lakes Tradition economy was based on hunting a variety of animals and birds and on gathering shellfish and vegetal products. The artifacts of the Western Pluvial Lakes Tradition were more varied, and the stone tools more refined and smaller, than those of the Big Game Hunting Tradition, with distinctive percussion-flaked stone artifacts making up a diverse toolkit, including stone crescents, scrapers, choppers, scraper-planes, hammerstones, drills, and gravers. But ground-stone artifacts were absent, indicating that hard seeds were not being exploited as food. (Moratto 1984, pp. 90–103). Near the CESF project area, a deeply buried Western Pluvial Lakes Tradition site was found in the lower components of CA-KER-116, near Buena Vista Lake (CESF2007a, p. 4-1). Additionally, Early Period components in multi-component sites have been identified along the relict shorelines of the now-drained Tulare Lake, in the southwestern portion of the San Joaquin Valley. Early Period stemmed projectile points have also been recovered from several sites in the foothills at the eastern margins of the valley, namely at the Skyrocket sites (CA-CAL-629 and CA-CAL-630) in Calaveras County and at the Clark's Flat site (CA-STA-S342) in Stanislaus County (CESF2007a, p. 4-2). Moratto sums up the primary cultural-historical developments of the Early Holocene era in California, listing several trends: increasing regional specialization, increasing technological diversification, increasing population, increasing sedentism, and intensification of use of plant resources (Moratto 1984, p. 113, Table 3.10).

Middle Holocene Period (5,000 to 500 B.C.)

After 5,000 B.C., the climate and environment that prevail today were established in California. Archaeologists' interpretations of this period saw Native Americans in Middle Holocene California refining their exploitative abilities by developing their technology and adapting to the seasonal availability of a wide variety of local food sources through

a mobile lifestyle that required no substantial houses or permanent villages. One of the key technological developments of this era was the millingstone, which was a rock slab or shallow basin shaped by painstaking grinding with a smaller rock and used to process hard seeds into meal. Along with millingstones, important developments in this era in California were: the appearance of many large shell midden sites on the bays and estuaries of what are now San Diego and Orange Counties; the wide regional distribution of shell beads; and the introduction of pottery and clay figurines. These developments were thought to signal the greater exploitation of marine resources on the coast, the greater exploitation of vegetal food sources throughout the region, and the development of a regional trading network (Moratto 1984, pp. 147–153).

A more recent archaeological interpretation of the Middle Holocene, based on several subsequent decades of field work, in part contradicts and in part refines key aspects of the earlier interpretation. Shell bead studies have shown the Middle Holocene trade network was considerably more extensive than previously suspected, across the entire southern California region, and north through the Great Basin as far as what is now southeastern Oregon (Byrd and Raab 2007, pp. 220–221). Excavations at Middle Holocene sites in the southern Channel Islands have revealed substantial houses framed with whale ribs, situated in what appears to be a permanent village, possibly occupied year-round. These structures may be the earliest known residential structures in the state (Byrd and Raab 2007, pp. 221–222). Closer to the CESF project area, characteristic Middle Holocene Period projectile points have been recovered from the upper levels of CA-KER-116, the Witt site, the Skyrocket sites, and the Clark's Flat site (CESF2007a, p. 4-2).

Late Holocene Period (500 B.C. to European Contact)

Archaeological interpretations of this period in California identify it as the developmental time for the Native American groups and lifeways that Euro-Americans encountered and described. These interpretations recognized three gradual changes: increasing social complexity in adaptation to a stable, resource-rich environment; assimilation of the technology and practices of neighboring Native American groups; and immigration to the coastal area by Native American groups from the eastern interior (Moratto 1984, p. 153; Byrd and Raab 2007, p. 222). The most important new introduced practice was the technology of processing acorns for food, in particular ground-stone mortars and pestles. Another new practice introduced in this period was cremation of the dead, probably adopted from Native American groups to the east. The use of the bow and arrow and of pottery emerged during this period, as well (Moratto 1984, p. 154). Additionally, archaeologists note that large occupation sites, representing semi-permanent and permanent villages, also appear. On the western margins of the San Joaquin Valley, these village sites typically feature dark-colored midden deposits, multiple excavated house-pit depressions, and large, excavated communal structures (CESF2007a, p. 4-2).

To explain these changes, archaeologists pointed to linguistic evidence, which suggested that, beginning around 500 B.C. at the latest, newcomers emigrated from the Great Basin area to the coast between northern San Diego County and southern Los Angeles County. The migrants displaced the resident groups but rapidly adopted the local technology and economic practices. The descendants of the migrants include the

Luiseños, Gabrielinos, and Nicoleños. The migrants' displaced neighbors to the north were probably the ancestors of the Chumash, and to the south, the ancestors of the Diegueños (Moratto 1984, pp. 156, 164–165).

A more recent archaeological interpretation of the Late Holocene Period, based on several subsequent decades of field work in part contradicts and in part refines key aspects of the earlier interpretation. Instead of environmental stability and an adaptive balance between the population and the resources, the new interpretation sees a trend toward overexploitation of high-value food species resulting in intensified use of less-productive food species and less foraging efficiency over time. A related change in settlement pattern occurred in the Late Holocene, in which three linked kinds of sites were arrayed over a group's territory: large, permanent residential bases, short-term, satellite, residential camps, and specialized-activity sites, facilitating the necessary intensified use of lesser-value foods. A related change in social complexity is posited, brought about by the need for structured decision-making and labor assignment, resulting in the emergence of differing social statuses within a group. A possibly causal factor is implicated by paleoenvironmental data, which indicate that periods of drought and other environmental stresses may have required rapid adaptation and could have played a role in all of these changes (Byrd and Raab 2007, pp. 224–225). The newer interpretation additionally explains the Late Holocene Period immigration of Great Basin newcomers into California as the continuation and expansion of the linkages between the two areas forged in the Middle Holocene via the shell bead trade network (Byrd and Raab 2007, p. 221).

The Late Period refers to the time between approximately 500 B.C. and European contact, at which time Native American lifeways were recorded in the ethnographic/historic record. The material culture patterns observed at contact emerged during the Late Holocene Period, and the ethnohistoric record provides a valuable resource for understanding Late Holocene Period archaeology (see below). The archaeological record for the Late Holocene Period reveals a significantly different type of material culture than seen in Middle Holocene Period assemblages. Heavily utilized mortar and pestle technology (associated primarily with acorn processing), and bow and arrow technology both emerge during the Late Holocene Period. Large occupation sites, representing semi-permanent and permanent villages, emerge during this time as well. On the western margins of the San Joaquin Valley, these village sites typically feature dark-colored midden deposits, multiple excavated house-pit depressions, and large, excavated communal structures. Other artifacts typical of the Late Holocene Period include freshwater and marine shell ornaments, ornaments and utilitarian implements of steatite and faunal bone, obsidian from eastern California sources, and notched cobbles thought to be associated with fishing.

Ethnographic Setting

Yokuts

At least three Native American groups have asserted traditional ties to the Carrizo Plain: the Southern Valley Yokuts of the San Joaquin Valley, the Interior Chumash, associated with the Cuyama River and Sisquoc River watersheds, and the Salinan, known from the coast and coastal mountain valleys between Soledad and the headwaters of the Salinas

River (Wallace 1978, p. 448; Grant, p. 500; Hester, p. 530). Anthropologist believe that Native Americans had no permanent settlements in the Carrizo Plain because both water and game were available only seasonally (CESF2007a, p. 4-3).

Yokuts is a term applied to a large and diverse group who formerly inhabited the San Joaquin Valley and Sierra Nevada foothills of central California. Anthropologists have divided the Yokuts into three groups based on geographical location. The Northern Valley Yokuts occupied a 40- to 60-mile-wide area straddling the San Joaquin River, south of the Mokelumne River, east of the Diablo Range, and north of the sharp bend that the San Joaquin River takes to the northeast. The Foothill Yokuts occupied the western slopes of the Sierra Nevada from the Fresno River southward to the Kern River. The Southern Valley Yokuts, within whose sphere of interest the proposed CESF project site may be located, occupied the area around Tulare, Buena Vista, and Kern Lakes, between their connecting sloughs, and around the lower portions of the Kings, Kaweah, Tule, and Kern Rivers. The waterways provided a ready means of travel, as well as an abundant supply of animal and plant foods and materials. Tules, which could grow as tall as 10–12 feet, dominated the region, with sage, greasewood, and bunchgrass found in the drier areas, but the entire territory lacked the oaks that were so central to the diet of many California Native Americans (Wallace 1978, pp. 448–449).

The marshes and sloughs reliably provided lake trout, chub, perch, and suckers, with salmon and sturgeon sometimes also available. The Southern Valley Yokuts hunted waterfowl, such as geese and ducks, and would take an occasional elk when one came to the lakes to drink, but the Yokuts rarely ventured into the open country to hunt the antelope, elk, and deer that ranged there. The marshes also provided turtles, shellfish, seeds, and tule roots. Tule reeds were the raw material for many necessities, including containers, shelters, and rafts. The Southern Valley Yokuts had ample fish and tule reeds to trade for the resources they lacked but needed, such as: wood for structures, digging sticks, and bows; stone for arrowheads and tools; and acorns (Wallace 1978, pp. 449–452). The Southern Valley Yokuts used asphaltum for various items of their material culture (Wallace 1978, figs. on pp. 452, 456, 458). They obtained the asphaltum from natural seepages in the Kettleman Hills, east of the AEP site, in Tar Canyon and near the town of Coalinga (Avenal Historical Society n.d.).

The Southern Valley Yokuts built permanent villages including single-family and multi-family houses consisting of a wooden framework with woven tule mat coverings. Other village structures included raised tule-mat covered granaries and a dirt-covered men's sweathouse (Wallace 1978, pp. 450–451). The Southern Valley Yokuts lived most of the year in their villages, but, starting in the spring and for most of the summer, migrated to camp out in parts of their territories to gather various wild plant foods, shifting locations as each crop became mature (Wallace 1978, p. 454).

The smallest political unit was a tribelet averaging 350 persons, living in a single village or in several settlements among which one was the largest and recognized as dominant. Each tribelet had a territory of some 250 square miles whose resources every member had a right to use. No unified organization of Southern Valley Yokuts tribelets existed. A chief headed each village and had considerable, if only local, authority. This office usually was inherited through the male line of the most prestigious totemic lineage, that of the Eagle. The chief scheduled ceremonies, mediated disputes, handed

down death sentences for transgressors, authorized trading expeditions, played host to visitors, and was expected to give charity to the indigent. Neighboring tribelets were generally on friendly terms, but small wars and feuds occasionally occurred (Wallace 1978, p. 454).

The Spanish settlement of Alta California began in 1769, but it was not until the early nineteenth century that the Spanish governor and the missionaries of the Catholic Church began systematically to explore the great interior valley, hopeful of making fresh converts and expanding the mission system (Wallace 1978, p. 459). The missionaries recruited and settled a few Southern Valley Yokuts at Missions San Luis Obispo, San Juan Bautista, Soledad, and San Antonio, but the Spanish had little impact on the great majority of the Southern Valley Yokuts. Of much greater influence were the many runaway mission neophytes, for whom the southern San Joaquin Valley became a refuge from the discipline and steady labor the padres imposed on them. The runaways brought to the Southern Valley Yokuts a wide range of new practices, both from their previous traditional ways and the new ways taught them by the Spanish. From their exposure to the runaways, the Southern Valley Yokuts became particularly keen to acquire horses, both to eat and to ride. They began raiding mission and rancho herds and were so successful at it that the Spanish referred to them as the “Horsethief Indians” (Wallace 1978, pp. 459-460).

After 1821, the succeeding Mexican administration made no greater inroads into settling the San Joaquin Valley than the Spanish had, but vengeful rancheros pursued a policy of raiding the interior villages to recover livestock, to punish thieves, and to capture slaves to work on their ranchos. This interaction exposed the Southern Valley Yokuts to European diseases to a much greater degree than had occurred previously, and in the summer of 1833, a particularly severe malaria epidemic devastated them, resulting in a mortality rate estimated at 75 percent (Wallace 1978, p. 460).

In the wake of the Gold Rush, the territory of the Southern Valley Yokuts was overrun and seized by white settlers. The Yokuts, never very warlike, greatly reduced in numbers, and vulnerable in their exposed open habitat, put up little resistance. In 1851, representatives of the Southern Valley Yokuts signed a land cession treaty in exchange for large reservations and payments in goods. The treaty, however, was never ratified by the U. S. Senate, and the reservations never materialized. After several relocations to temporary reservations, the remaining Southern Valley Yokuts, along with other Native American groups, were settled on two reservations, the Tule River Reservation, in the Sierra Nevada foothills near Porterville, and the Santa Rosa Reservation, in the valley near Lemoore (Wallace 1978, p. 460).

Interior Chumash

Based on ethnohistoric accounts, anthropologists divide the Interior Chumash into three groups, the Cuyama (or northern Interior Chumash) of the Cuyama Valley, the Emigdiano, of the San Emigdio Range; and the Castaic, of the Tejon area. The Cuyama are thought to be the Chumash who regularly used the Carrizo Plain and who probably created the remarkable polychrome rock paintings at Painted Rock (CA-SLO-79), a ceremonial site. One anthropologist credits the Yokuts as the source from which the Cuyama Chumash learned the rock-painting tradition, which, he believes, attained its

highest development in the Carrizo Plain (Grant 1978, p. 532). “Other researchers have stated that Painted Rock’s stylistic elements indicate a joint use of the Carrizo Plain by different Native American groups. The area has been as interpreted as an interface between Native American groups, and that Painted Rock was a “cultural crossroads” where groups used the site sequentially or together” (CESF2007a, p. 4-4).

Spanish expeditions through the Cuyama Valley in 1806 (from Misión Santa Ynez) and 1824 (from Misión Santa Barbara) identified between them only 10 small villages, with the largest composed of 9 houses and 41 persons. Possibly many Cuyama Chumash had already gone to the missions, leaving their territory sparsely inhabited (Grant 1978, p. 530). This area may also have served as a first refuge for neophytes fleeing the Misión Santa Barbara after a revolt in 1824. The fact that some of these people were subsequently apprehended at a Yokuts village at Buena Vista Lake is suggestive of on-going Chumash cultural ties with the southern San Joaquin Valley (CESF2007a, p. 4-4).

Very little is known of the lifeways of the Cuyama Chumash, although a number of village and cemetery sites have been at least partially archaeologically excavated, and many items of material culture have been recovered from dry caves in the mountains surrounding the Cuyama Valley. Rock paintings were common in the investigated caves. Of note were the elaborate and abundant ornamental grave goods found with the burials, with marine shell items evidencing continuing coastal contact, despite the distance of a rugged 20 miles between the coast and the Cuyama Valley (Grant 1978, p. 531).

Salinan

Anthropologists recognize two Salinan subgroups, a northern division which was gathered into the Misión San Antonio de Padua and so became known as Antoniaños, and a southern division that the Misión San Miguel enticed into service, who became thus known as Migueleños. The Salinan were active traders of maritime goods, particularly shells, with their neighbors to the east, the Yokuts, but had generally hostile relations with their northern neighbors, the Esselens and, particularly, the Costanoans, and their southern neighbors, the Chumash, probably because these coastal groups competed with the Salinans for the trade of the Native Americans of the interior (Hester 1978, p. 500).

Villages were the major political units of the Salinans, and they were autonomous. Villages often feuded (Hester 1978, p. 502). Village chiefs had the sole authority to rule their village, and primogeniture was practiced, with community approval. Among the Migueleños, a chief was both his village’s domestic authority and the war leader, which was unusual among California Native Americans (Hester 1978, p. 503).

Plant foods, particularly acorns, were the most important subsistence component. Acorns were stored in willow-twig granaries. Other plant foods the Salinans used included sage seed, wild oats, berries, and wild fruits. Deer, bear, rabbits, and birds were hunted, using self- and sinew-backed bows and cane arrows with hardwood foreshafts. Both shoreline and streams were fished with fishhooks made of shell. Houses were domed with a pole framework covered with tule or rye grass. Communal structures and dance houses were reported but not described, including sweathouses

(Hester 1978, p. 501). Shell beads formed Salinan currency, and the rarer, the more valuable. The Salinans had a system of numbers, a calendar, and knowledge of astronomy. The golden eagle was the chief deity, but prayers were offered also to the sun and moon. Shamans were primarily devoted to curing injury and illness, for which they used bloodletting, herbs (willow bark for fever and toloache (*Datura*) for pain relief from burns and broken bones), and sweatbaths to effect cures. They also specialized in black magic and poisons (Hester 1978, p. 502).

In 1771, Misión San Antonio de Padua was the first mission to be established in Salinan territory. At that time the Salinan population has been estimated at 3,000. The northern subdivision of the Salinans accepted the padre's conversion and training readily, adapted well to learning agriculture, stock raising, and weaving, and so became Antoniaños. Similarly, the southern Salinan subdivision, after 1797, when Misión San Miguel was founded, became Migueleños. Mission life had a drastic effect on the Salinan population, with their numbers reduced to 700 by 1831, and this decline accelerated after the missions were secularized and the Native Americans released to make their own living. In 1928, 21 Antoniaños and 14 Migueleños were counted (Hester 1978, p. 503).

Historic Setting

The Carrizo Plain was identified in the Spanish-Mexican period (1790-1850) as Llano Estero. Its remote location, lack of early trails or roads, limited rainfall, and subsurface water table discouraged settlement. It is possible that the coastal missions may have used the area for seasonal grazing, but no attempts were made to colonize the area until the beginnings of the American period (Wesson 2005, p. 12).

Following the Treaty of Guadalupe-Hidalgo (1848) the federal government extended the general land survey to California. The Carrizo Plain was surveyed in 1855-1856 and was opened to settlement. However, a substantial portion of the surveyed land was "withheld" for possible future railroad development. The reservation of the railroad sections significantly limited the amount of land available for purchase or homestead. Most of the remaining land was quickly swept up by San Francisco land speculators and large cattle interests. August Hemme, William Chapman, and James McDonald acquired thousands of acres in the northern Carrizo Plain, while George Schultz and Henry Von Bargen patented more than 27,000 acres in the southern plain. Haggin and Tevis acquired another 15,000 acres in the south. This pattern of land ownership, which concentrated large holdings in a few hands, also foreclosed general settlement in the Carrizo from the 1850s to the 1880s.

The primary land use in the period from 1855-1880 was cattle grazing, carried out largely on a seasonal basis that took advantage of the lush spring growth of native and introduced grasses in the basin. The Carrizo Plain during this period served the interests of some of the California's largest corporate ranching empires. Haggin and Tevis, later known as the Kern County Land Company, owned huge ranching interests in Kern and San Joaquin Counties. The large McDonald land holdings were leased by Miller and Lux, also a giant ranching and meat-packing interest with headquarters near Gilroy in Monterey County and slaughterhouses in San Francisco (Eichel 1971, pp. 8–10). One of the only nineteenth-century settlers in the basin was Chester Brumley, who

managed McDonald's holdings from a ranch in the southern plain known as El Saucito, now within the boundaries of the Carrizo Plain National Monument (Wesson 2005, p. 12).

In 1885, California released the railroad indemnity lands in the Carrizo Plain, making them available for homesteading or public sale. This land availability attracted a small number of settlers who took up 160-acre homesteads along the low hills on the northeast margin of the plain under the auspices of the Immigration Association of California (Eichel 1971, p. 19). These homesteaders also engaged in cattle-raising, but were hampered in their efforts both by small land holdings and the isolation of the plain from market centers. This settlement resulted in the development of the first public services and agriculturally related businesses in the plain. A flour mill and blacksmith shop were established, a post office was designated at Simmler, and a school district was formed (Eichel 1971, p. 21). Despite this increased settlement, the Carrizo Plain remained predominantly an area of large holdings with cattle-raising as its primary economic activity.

In the early 20th century a fundamental change occurred in the agricultural economy of the Carrizo Plain that substantially altered land use, settlement patterns, and the natural landscape. While cattle-raising remained a part of the economy, particularly in the southern Carrizo Plain, dry-land wheat farming became the dominant form of agriculture in the northern plain from the 1900s through the 1960s.

As early as the 1890s, farmers in the Carrizo began to turn to wheat production. But it was not until the early twentieth century that the impediments of difficult transportation and unmechanized labor were overcome sufficiently to allow wheat-growing on a commercial scale. The soil, climate, and large concentrated land holdings in the plain were pre-existing natural and economic conditions ideally suited to growing hard milling wheat, which received premium prices in the marketplace. In the early twentieth century, several technological and transportation developments made it possible for the Carrizo Plain to successfully develop large-scale dry farming of wheat. Through the 1880s the principal road linking the Carrizo Plain to railroads and markets, as well as supplies, was a wagon road over the San Jose Range from Pozo to La Panza and then to Santa Margarita. Even under the most favorable conditions, this was a long and difficult trip. In the 1890s a new county road linking San Luis Obispo to McKittrick was constructed through the northern portion of the lain, along the general alignment of present-day Highway 58. This east-west route ended some of the isolation of the plain. The road linked the wheat fields to the railroad in Kern County that had been extended in 1908 to McKittrick, only sixteen miles from the plain. Improved roads and nearby railroad access made it possible to move large grain crops to market.

Probably the single most important factor in shifting the local economy to wheat growing was the development of the mechanized tractor. These machines made possible the cultivation of large acreage with a small expenditure of labor. Expensive to purchase, these machines could only be used economically on farms of 5,000 acres or more. After 1930 the introduction of heavy-duty trucks further rationalized the transporting of the harvested wheat to market.

From the early twentieth century until the 1960s, Carrizo Plain agriculture was based on the production of hard wheat. In 1933, the plain produced approximately 30,000 acres of wheat, and it nearly doubled that acreage during World War II, at the height of the wheat production economy (Eichel 1971, p. 32). Cattle ranching did not disappear, but became a secondary activity, with cattle pastured in upland areas on either side of the basin, and allowed to graze the wheat stubble in the valley after harvests.

The change from subsistence farming and cattle ranching to commercial, one-crop farming substantially not only changed the economy of the Carrizo Plain, but also had a profound impact on land use, settlement patterns, and land ownership. Land belonging to small operators and homesteaders was absorbed by larger owners, so that during the 1920s and 1930s the average farm on the Carrizo Plain was approximately 6,000 acres (Eichel 1971, p. 35). Ownership was often divided between an “operator” or farmer who worked the land, and an absentee owner, who leased agricultural acreage to the operator. In many cases a pattern developed whereby the operator owned the farmstead—the small land parcel with the farm residence and operations structures on it— while the absentee landowner retained the majority of open cultivatable land (Eichel 1971, p. 37).

Farmsteads were widely separated and had a distinctive character. Usually they were composed of a primary residence, a well and pump house, storage sheds, gasoline tank and pump, a machine/blacksmith shop, and one or more smaller houses and/or bunk houses. In addition to these common rural buildings and structures, the farmsteads included specialized structures for the processing and storage of wheat. Among the most distinctive were the bulk tanks, often conical in shape, used for storing harvested wheat prior to loading it onto trucks that would take it to the rail head in McKittrick. Conveyor belts and raised platforms for moving wheat crops were also frequently found on these farms. Ornamental trees were planted around the farmsteads on the formerly treeless plain. Fencing was introduced to prevent cattle from foraging in the wheat fields until after harvest. In many cases, corrals and loading chutes for cattle were also present, indicating that the farms continued to raise cattle as a secondary economic activity.

These changes in the physical landscape of the Carrizo Plain were more marked in the north than in the south. The southern plain remained in highly concentrated ownership and was not marked by the emergence of “operator” farmsteads to nearly the degree that this occurred in the northern plain. Consolidated ownership also led to less fencing to separate properties and manage wheat fields. Cattle continued to play a more significant role in the total ranching operations (Eichel 1971, p. 39; Supernowicz 1991, pp. 13–14).

In the 1960s the federal government introduced agricultural programs that established a national wheat acreage allotment, limiting the amount of wheat a single farmer could produce. The profitability of wheat-farming in the plain had always depended on large-scale production, so the government-imposed limits on production had a drastic effect on Carrizo Plain wheat farmers. Moreover, the soil, temperature extremes, limited rainfall, and lack of irrigation resources in the Carrizo Plain did not afford them the option of turning readily to other crops. While barley and alfalfa continue to be grown,

much of the land has been allowed to revert to grazing (Eichel 1971, p. 45). By the 1970s the amount of land left fallow in the plain had risen significantly, and, although wheat farming continues on a small scale, the distinctive dry-farming economy and land-use patterns that it fostered are disappearing.

In 1960, an Arizona lawyer, Richard Walker, and a group of investors purchased the El Chicote, a large cattle ranch located north of Soda Lake. The developers planned a large housing subdivision of over 7,000 2.5-acre parcels, with shopping centers, parks, swimming pools, and a golf course. With very favorable purchase terms—only $10.00 down—and a national advertising campaign in magazines such as *Life* and *Reader's Digest*, Walker expected to bring 9,000 people to the development, called California Valley. Fewer than ten people had moved there by 1963. By 1968, 7,000 parcels had sold, but only 21 people actually lived in California Valley. An insufficient water supply, the absence of electricity and telephone service, and a location quite remote from essential protective and medical services discouraged people taking up actual residency. Today, the area remains sparsely populated, with little infrastructure and none of the amenities originally planned (CESF2007a, pp. 5.7-15–5.7-16).

Another experimental development in the northern Carrizo Plain was the ARCO Solar Project, constructed in 1983 on the section due east of the section on which the proposed CESF project would be located. The technology was photovoltaic, and at its peak production point, the plant produced 5.2–6.5 MW of power. Unsubsidized, however, it could not compete with fossil-fuel-burning power generation. The facility was dismantled in the late 1990s (CESF2007a, pp. 5.7-16–5.7-17, 5.9-3).

RESOURCES INVENTORY

The inventory of cultural resources in the project vicinity is a necessary step in the assessment of whether the proposed project may cause a significant impact to a CRHR-eligible cultural resource and therefore have an adverse effect on the environment.

Inventory Compilation Methods and Cultural Landscape Guidance

The development of a cultural resources inventory entails working through a sequence of investigatory phases. Generally the research process proceeds from the known to the unknown. These phases typically involve doing background research to identify known cultural resources, conducting fieldwork to collect requisite primary data on not-yet-identified cultural resources in the vicinity of the proposed project, assessing the results of any geotechnical studies or environmental assessments completed for the proposed project site, and compiling determinations of historical significance for any cultural resources that are identified. This subsection describes the research procedures used by the CESF and Energy Commission staff for each phase. The results of these procedures are presented in the "Results" subsection below.

The specific investigatory process for the potential cultural landscape staff identified in the northern Carrizo Plain involved background research in primary and secondary sources on the history of the plain, research to identify known historical resources that could be contributors to the cultural landscape, definition of a preliminary and final project study area of sufficient scope to allow for a full assessment of the entire potential

cultural landscape, and field work to identify and evaluate the general characteristics and individual elements of the cultural landscape.

The idea of the cultural landscape as a kind of cultural resource is an expansion of the idea of the "historic district," one of the categories, along with sites, buildings, structures, and objects, of cultural resources that can be nominated to the National Register of Historic Places (NRHP) and/or to the CRHR. In the early 1980s, the National Park Service (NPS) recognized that the historic district concept was too limited. They needed a larger concept of a kind of cultural resource that was more inclusive of diverse elements, so it could include natural features (vegetation and animals) as well as cultural ones, and be larger in scale than a historic district, so it could include thousands of acres and could even possibly include component landscapes and historic districts as well as individual buildings, structures, and landscape features such as fields, watercourses, and roads. So the cultural landscape concept was born, but like the historic district concept, it had to have a defined Period of Significance and defined boundaries, both of which could be justified on the basis of historical and geographic facts.

Since then, the NPS has provided considerable guidance for identifying and evaluating cultural landscapes. Four kinds of cultural landscapes are recognized (Birnbaum 1996, pp. 4–5):

1. The historic designed landscape, for which the key idea is that the cultural landscape is the product of design, is exemplified in historic parks, campuses, and estates.

2. The historic site, for which the key idea is that the cultural landscape is associated with a historic event, activity, or person, is exemplified in Civil War battlefields, revival campgrounds, and presidents' homes.

3. The ethnographic landscape, for which the key idea is that the cultural landscape is associated with an ethnic group's heritage, is exemplified in Native American sacred sites and traditional resource gathering areas.

4. The historic vernacular landscape (vernacular in this usage means "folk," ethnic, traditional, or un-schooled), for which the key idea is that the cultural landscape evolved through everyday use by ordinary people, is exemplified in rural villages and agricultural landscapes, whether a single farm or a district of historic farms in a region.

The fourth type, the historic vernacular landscape, is the kind of cultural landscape that staff has identified in the northern Carrizo Plain, designated by staff as the Northern Carrizo Plain Cultural Landscape Historic District (NCPCLHD). This type is also known as a "rural historic landscape," which NPS guidance defines as:

> A geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of

> land use, vegetation, buildings and structures, roads and/or waterways, and natural features (McClelland, et al. 1999, p. 1).

In contrast to a designed landscape, such as a garden or park, a rural historic landscape evolves over time and reflects the day-to-day occupational activities of people engaged in traditional work, such as agriculture. Generally rural historic landscapes are characterized by a high ratio of open cultivated fields or pasture land in relation to the number of buildings, sites, and structures. Rural historic landscapes may encompass many hundreds or even thousands of acres of land.

Rural historic landscapes possess tangible features, called landscape characteristics, which represent patterns of human usage and demonstrate the interaction between economic activity and the natural environment.

NPS guidance is also available for identifying Register-eligible rural historic landscape characteristics, focusing on four processes that are instrumental in shaping land. These processes include land uses and activities, patterns of spatial organization, responses to the natural environment, and cultural traditions that have guided the ways in which land is used, occupied, or worked. NPS guidance also identifies seven other characteristics, considered to be physical components that are evident on the land, which assist in identifying rural historic landscapes: circulation networks, boundary demarcations, vegetation related to land use, buildings, structures/objects, clusters, archaeological sites, and small-scale elements. An analysis of all these elements provides a format for documenting rural historic landscapes and determining if a Register-eligible rural historic landscape is present (McClelland, et al. 1999). It should be noted that not all Register-eligible rural historic landscapes necessarily contain all of the components considered by the NPS.

Literature and Records Search

Reid Farmer, URS Project Archaeologist and consultant to Ausra, directed all cultural resources research activities for the proposed CESF project. On April 30, 2007, URS archaeologist Dustin Kay requested a records search from the Central Coast Information Center (part of the California Historical Resources Information System, or CHRIS) at the University of California, Santa Barbara (CESF2007a, p. 5.7-18). The requested search was to identify all recorded cultural resources located on or within a one-mile radius of the boundaries of the 1,020-acre proposed CESF project site and laydown area, including:

- previously recorded prehistoric and historic archaeological sites and isolates;
- site record forms and updates for all cultural resources previously identified; and
- previous investigation boundaries and National Archaeological Database (NADB) citations for associated reports, historic maps, and historic addresses.

In connection with a field evaluation of the potential historical significance of eight historic-period built-environment resources that were located within a 0.5-mile radius of the proposed CESF project site, URS architectural historian Jeremy Hollins carried out background research at the San Luis Obispo City-County Library History Room, the San Luis Obispo County Assessor’s Office, the San Luis Obispo County Clerk-Recorder’s

Office, and the San Luis Obispo County Planning and Building Department Office. He also reviewed materials at the San Luis Obispo County Historical Society Archives; and the Kennedy Library Government Documents and Map Department at California Polytechnic State University, including historic maps and photographs (for example, U.S. Geological Survey maps, plat maps, U.S. Department of Agriculture aerial photography), newspaper articles, government records, titles, deeds and chattels, journal articles, and other relevant data (CESF2007a*,* p. 5.7-20). Additionally, Mr. Hollins conducted a field evaluation of the eight built-environment resources he identified.

Based on the historical background Ausra provided in the Cultural Resources section of the AFC, in January, 2008, staff tentatively identified the entire Carrizo Plain as a potential cultural landscape. In April and May, 2008, staff completed further research. Carol Roland, Ph.D., of Roland Nawi Associates, Preservation Consultants, undertook and/or directed all cultural landscape research. Ms. Roland conducted research at the California State Library, Sacramento; California Polytechnic State University, San Luis Obispo, Special Collections; the San Luis Obispo Historical Society; the San Luis Obispo City-County Library; the San Luis Obispo County Assessor Office; and the University of California, Berkeley, Earth Sciences Library. Sources consulted included historical materials related to the Carrizo area and a number of historic maps and aerial photographs, particularly U. S. Department of Agriculture (USDA) land survey maps and aerial photographs. With the assistance of the Cartography Unit of the Energy Commission's Siting, Transmission, and Environmental Protection Division, aerial photographs were downloaded for each section within the study area (USDA 2005). These recent photographs allowed a close examination of remaining field patterns, crop and grazing land use, boundary demarcations, location and composition of building enclaves, and primary and secondary circulation patterns over a wide area of the northern Carrizo Plain.

From this research, based on a historical geography Master's thesis (Eichel 1971), on several Carrizo Plain histories (Angel 1883, Jesperson 1939, Robinson 1957), on the comparative study of historic maps and aerial photographs of the plain, on evaluation of Ausra's newly recorded built-environment resources in the northern plain, and, finally, on field inspection within the Carrizo Plain itself, staff defined a cultural landscape study area limited to the northern Carrizo Plain. This study area is approximately bounded by the 2,000–2,200-foot elevation lines from T 28S 17E to T 29S–30S R18E–19E (see Cultural Resources Fig. 1), representing the basin floor of the northern plain where mechanized, dry-land wheat growing was most feasible and historically concentrated. This area includes approximately 19,800 acres. Rural cultural landscapes are often large in acreage and have a proportionally small number of buildings and structures in relation to land area. Because of the large scale required for profitable dry-land, hard-wheat farming (farms in excess of 6,000 acres), the cultural landscape study area had to be defined to exceed the usual limit of a one-mile radius from the project site. Without a large-scale perspective it would be impossible to assess whether or not a CRHR-eligible cultural landscape is present in the vicinity of the proposed CESF project.

Staff also had to identify contributing natural and built-environment elements of the potential Northern Carrizo Plain cultural landscape. The built-environment survey report

prepared by Ausra consultant, Jeremy Hollins, an architectural historian with URS, was an important source in this process (Farmer 2007). Hollins's report included DPR 523A and 523B survey and evaluation forms for the eight built-environment resources, aged 45 years or older and located within a one-mile radius of the proposed CESF project site that Hollins identified as historical resources potentially affected by the proposed project.

Later, in response to staff Data Request 101, Mr. Hollins conducted further background research and field work on an additional eight historic-period, built-environment resources identified by staff as possible contributors to the potential the Northern Carrizo Plain cultural landscape. These eight resources were known, from the historic map study, to be 45 years of age or older, but were located in excess of one mile from the proposed project site but within the Northern Carrizo Plain cultural landscape study area. On August 6–7, 2008, Mr. Hollins completed both background research and a "windshield" survey of the eight resources. Mr. Hollins reviewed materials at the San Luis Obispo County Planning and Building Department, the San Luis Obispo County Assessor's Office, the Kennedy Library Government Documents and Map Department at California Polytechnic State University, and the San Luis Obispo City-County Library History Room (CESF2008i, Data Response 101). All of the resources recorded by Mr. Hollins are discussed in greater detail and evaluated for CRHR-eligibility as individual resources below, under "Results."

Inquiries to Local Agencies and Historical and Archaeological Organizations

As documented in the AFC Data Adequacy Supplement, on December 5, 2007, Jeremy Hollins contacted Elizabeth Kavanaugh and Holly Phipps of the San Luis Obispo County Planning and Building Department regarding the presence of known cultural resources located within a one-mile radius of the proposed CESF project site and within 0.25-mile of proposed linear facilities. Also on December 5, 2007, Mr. Hollins contacted Ronald E. Clarke, Society Manager of the San Luis Obispo County Historical Society, making the same inquiry about known cultural resources within the distances noted (CESF2007d, CUL-2, Attmnts. A, B).

Native American Coordination

On June 20, 2007, Brent Leftwich, URS Archaeologist and consultant to Ausra, asked the Native American Heritage Commission (NAHC) to search its Sacred Lands File for any Native American traditional cultural properties in the vicinity of the proposed CESF project. He also asked for a list of Native Americans who had heritage ties to San Luis Obispo County and wanted to be informed about new development projects there. The NAHC responded on June 28, 2007, indicating a negative return from the search of their Sacred Lands File and providing contact information for 24 Native American groups and individuals. Mr. Leftwich sent letters, dated July 18 and August 28, 2007, to these groups and persons, describing the proposed CESF project and requesting information on known cultural resources that could be affected by the project (CESF2007a, p. 5.7-26; Farmer 2007, App. B). Ausra provided to the Energy Commission a list of the persons contacted (Farmer 2007, App. B). No responses were received.

On February 1, 2008, Energy Commission staff also requested from the NAHC a list of Native Americans interested in development in San Luis Obispo County. Staff sent a

similar request for a list of Kern County Native Americans on February 8, 2008. On February 4 and February 8, staff received the two lists, totaling 15 groups or individuals to whom staff sent letters with information about the proposed CESF project on March 24, 2008 and asking to be contacted if the recipients had concerns regarding cultural resources in the project area. Staff received responses from two groups, detailed under "Results," below.

Field Surveys

The proposed CESF project site had not previously been surveyed for cultural resources. Archaeologist Brent Leftwich directed a team of seven that surveyed the proposed project site (Section 28) between June 25 and July 2, 2007, covering an area equal to the project's footprint plus a 200-foot-wide zone beyond the footprint and a 90-foot-wide corridor for the proposed project's connection to the Morro Bay-Midway 230-kV transmission lines. Mr. Leftwich later directed a team of three that surveyed the laydown area (northern portion of Section 33) between August 13 and 17, 2007. The survey crews walked over the entire two parcels in parallel 15-meter transects. Overall ground visibility averaged 80 percent. Observed ground disturbance included plowing, rodent burrows, livestock trampling, and road and building construction (CESF2007a, pp. 5.7-19–5.7-20).

On June 12, 2007, URS architectural historian Jeremy Hollins recorded and photographed from public vantage points eight historic-period built-environment resources that were located within a 0.5-mile radius of the proposed CESF project site. He also had access to the King and Cavanaugh I Farms, where his observations and recordation were more direct and detailed (CESF2007a, p. 5.7-20). He completed Department of Parks and Recreation (DPR) 523 "Primary" and "Building, Structure, and Object" forms for the eight resources, with evaluations of eligibility for the CRHR. The forms were included in the confidential technical report accompanying the AFC (Farmer 2007a).

On May 6, 2008, Carol Roland, Energy Commission consultant, and Beverly E. Bastian, Energy Commission staff, conducted a reconnaissance survey of the northern Carrizo Plain. This survey included a visual examination of the previously recorded historical resources, as well as farmsteads, fields, roads, and other buildings and structures in Townships 29 and 30S, Ranges 17, 18, and 19 E. Survey included farmsteads in section 24 T29S R17E, sections 29 and 22 in T29S R18E, and sections 1, 4, and 36 in T30S R18E. In addition, other properties located along the Highway 58 and the Bitterwater Road corridors were visually surveyed. Properties were photographed and noted on U.S. Geological Survey topographic maps.

Later, in response to staff Data Request 101, Jeremy Hollins conducted further field work on an additional eight, previously unrecorded, historic-period built-environment resources identified by staff as possible contributors to the Northern Carrizo Plain cultural landscape. These properties were all farms established in the northern Carrizo Plain prior to 1955. The historic owner names were derived from a 1941 San Luis Obispo County Department of Natural Resources map. On August 6–7, 2008, Mr. Hollins conducted a "windshield" survey of seven of these resources from public vantage points and completed DPR 523A and 523B forms for them, which were then

provided to staff (CESF2008i, Data Response 101). The eighth resource was only partially recorded because Mr. Hollins was asked by residents and neighbors to leave, despite his being on the public road.

Ausra also had URS conduct a geotechnical study of the proposed CESF project site, which included the drilling of eight borings to depths ranging between 30.5 and 95.5 feet below the ground surface, on June 20 and 22, 2007. The eight borings were drilled at locations about one-half mile apart to preliminarily sample the entire site (URS 2007b, pp. 2-1–2-2).

The results of all field studies are discussed below in the "Results" subsection.

Results

This section provides the results of the literature and records search, of inquiries made to local agencies and organizations, of Native American consultation, and of the applicant's field survey. Staff provides a description of each identified resource, its historical significance, and the basis for its significance evaluation. Assessments of the project's impacts on CRHR-eligible cultural resources, potential impacts on buried archaeological resources, and proposed mitigation measures for such impacts are presented in a separate section below.

Prehistoric and Historic-Period Archaeological Resources Identified and Evaluated for Historical Significance

Ausra's CHRIS records search identified reports from two prior cultural resources studies covering parts of the area within a one-mile radius of the proposed CESF project site and returned information on two known isolated prehistoric artifacts located within the same area. The previous studies were pedestrian surveys, and both dated to 1983. Both were associated with the planned ARCO Solar photovoltaic power plant project, which formerly occupied the section to the east of the proposed CESF. One of the previous surveys found no cultural resources (Sawyer 1983, sec. C) while the other found the two isolated artifacts—a chert flake and an obsidian biface fragment—that are the only known prehistoric archaeological resources within the area one mile around the proposed CESF project. These artifacts were not recommended as significant cultural resources (Serena 1983, pp. 3-4, 6), however, Salinan Tribe Traditional Lead John Burch commented to staff that these artifacts "are considered important, highly significant, to the Salinan people" (Burch 2008d).

Ausra consultant Jeremy Hollins's inquiries to the San Luis Obispo County Planning and Building Department and the San Luis Obispo County Historical Society regarding the presence of known cultural resources located within a one-mile radius of the proposed CESF project site yielded no additional information on known cultural resources in the project vicinity. Neither local authority identified any known cultural resources within one mile of the proposed project area (CESF2007d, Response to Data Adequacy Request 2).

Ausra consultant Brent Leftwich's inquiries to the NAHC and to Native American groups and individuals resulted in the identification of no additional prehistoric archaeological resources (CESF2007a, p. 5.7-26).

Staff received responses to its outreach to Native Americans from two groups. In an e-mail on February 26, 2008, Fred Collins, Tribal Administrator of the Northern Chumash Tribal Council identified the Carrizo Plain as “a very unique area” that “holds a history of the California Native Americans” and expressed an interest in having a tour of the proposed project. Ausra later arranged a tour of the proposed project for Northern Chumash representatives.

In an e-mail on May 12, 2008, Patti Dunton, the Salinan Tribal Office Manager, stated that many of the Salinan Tribe’s legends are based in the Carrizo area and that “we have concerns the project may have an impact to cultural sites and to the general energy of the area.” She requested a copy of any archaeological reports prepared for the project and stated that the tribe may wish to become an intervenor in the project. On August 15, 2008, staff asked Ausra to send the confidential CESF archaeological survey report to the Salinan Tribe, and Ausra complied. Staff also provided to Ms. Dunton contact information for the Energy Commission’s Public Advisor’s Office, where assistance in becoming an intervenor is available to the public.

Staff later communicated further with representatives of both interested groups. On August 15, 2008, John Burch, Traditional Council Lead of the Salinan Tribe, wrote staff stating that the tribe believed they had information pertinent to the CESF project and quoted their consultation rate. On September 5, 2008, staff telephoned Mr. Burch to notify him that the applicant would arrange a tour for Salinan Tribe representatives and gave him the person and telephone number to contact in this regard (Burch 2008a). On September 16, 2008, staff returned Mr. Burch’s telephone call. While Mr. Burch had previously explained that the Carrizo Plain was important in the Salinan Tribe’s oral tradition, he now further identified the project area as sacred. He would like for qualified Native Americans to have the opportunity to apply for jobs with the CESF. He felt that it was particularly appropriate for Native Americans to be involved with an alternative energy project. He informed staff that he had spoken with Perry Fontana of Ausra about taking a tour of the project, but that he and Gary Pierce, the Contemporary Council Lead for the Salinan Tribe, were still waiting for information regarding the final tour arrangements (Burch 2008b).

Staff spoke again with John Burch on September 30, 2008. Mr. Burch expressed concern that portions of the Cultural Resources section of the Application for Certification (AFC) were not correct. He said that he had an appointment with Jeremy Hollins of URS to discuss potential corrections. Staff explained that the Energy Commission would not require AUSRA or URS to rewrite a section of the AFC that had already been submitted for consideration. Staff invited Mr. Burch to provide comments to staff on the portions of the AFC that he felt were not correct. Mr. Burch faxed comments to staff on October 2, 2008, and these comments have been incorporated in the relevant places in this PSA. Mr. Burch also remarked that on May 12, 2008, the Salinan Tribe asked to be an intervenor on the project (Burch 2008c). On October 7, 2008, Nick Bartsch of the Public Adviser’s Office called Mr. Burch, explained the Energy Commission’s process, and directed him to the Commission website for both CESF information and information on intervening in the case (Bartsch 2008).

In addition, staff had further communications with Fred Collins, of the Northern Chumash Tribal Council. On September 16, and on September 22, 2008, staff telephoned Mr. Collins and left messages asking if he had any concerns regarding the CESF project and cultural resources. On September 23, 2008, staff spoke with Mr. Collins, who had previously toured the Carrizo Project site with the applicant. Regarding the CESF project's possible impacts to cultural resources, Mr. Collins expressed concern regarding sacred sites in the Carrizo area. He said that the area is regarded as a Chumash astrological center. He understood from the site tour that portions of the project would be approximately two stories tall and that light generated by the project would be directed upward. He expressed concern that the light would affect an observer's ability to see the sky and the nighttime view of the horizon (Collins 2008).

Mr. Collins was also concerned that Ausra is not proposing to use the nearby parcel where a previous solar project was located. He said that the tribe has suggested to Ausra that Ausra work with PG&E to use land that is ready for a solar project rather than using the proposed location. Mr. Collins said that the former photovoltaic project parcel was previously owned by PG&E and is now managed by a land conservancy. He stated that the Northern Chumash are next in line to be able to obtain that parcel. Mr. Collins explained that the Northern Chumash Tribal Council would be willing to consider working with Ausra to facilitate project development on that parcel. Mr. Collins said that he had expected to continue conversations with Ausra, but the Northern Chumash have not heard from Ausra since the site tour (Collins 2008).

Ausra's preliminary geotechnical report provided the results of a study in which the geotechnical consultant drilled eight borings, ranging in depth between 30.5 and 95.5 feet. The borings, as well as the cone penetrometer soundings and laboratory tests on recovered soil samples, identified the first 100 feet of subsurface soils at the proposed CESF site as alluvial clayey sand, sandy clay, and clay, with sand, silt, and gravel in minor amounts. The study also identified the uppermost two to four feet of the site's soils as having been affected by disking or other mechanical impacts. The absence of distinctive layers of any great extent across the site indicates the deposition of the materials in a low-energy alluvial plain environment, in which small drainages shifted location often (URS 2007b, pp. 2-1–2-2, 3-3).

Staff examined the geotechnical report's boring logs but could identify no soils that were obviously affected by human activities (URS 2007b, App. B). No conclusions regarding buried archaeological deposits in the proposed project site could be reached from this examination, however, because the boring samples represent only very tiny, widely separated windows on subsurface conditions over a one-square-mile area. The geotechnical study's interpretation of the alluvial deposition patterns at the site indicates that any remains of prehistoric human activity on the site would have been buried under regularly accreting layers of mixed sand, silt, and clay. This means that buried archaeological deposits could exist. Salinan Tribal Council Traditional Lead John Burch pointed out that no archaeological research has been conducted to discover buried sites in the Carrizo Plain (Burch 2008d).

Ausra consultant Brent Leftwich's survey of the proposed CESF proposed project parcel and laydown area resulted in the identification of no prehistoric archaeological artifacts or deposits, but two historic-period archaeological sites were identified and recorded.

These sites represent the archaeological aspects of the King and Cavanaugh I farmsteads, located, respectively, on the proposed plant parcel (Section 28) and on the proposed laydown area (northern portion of Section 33) (CESF2007a, p. 5.7-20). The King and Cavanaugh I farmsteads were also recorded by Ausra as built-environment resources, discussed below.

Located in approximately the middle of Section 28, at the end of an unpaved driveway extending north from Highway 58, the King farmstead is an unoccupied wheat-farming and cattle-raising complex consisting of a house, a barn-garage, two sheds, six collapsed structures of an unidentified nature, five grain silos, a corral, water storage tanks and troughs, two shallow, earthen-bermed ponds, derelict agricultural equipment, trash piles, and an extensive surface scatter of domestic and agricultural trash over the grounds of the entire complex. The complex is surrounded by nearly 640 acres of fallow farm land. Historically, the first building on the King farmstead was a barn, constructed in 1920 (URS 2007a, p. ES-2). Walter William King and his wife, Lottie, occupied the farmstead in 1928 and obtained a Crop and Chattel mortgage for the section in 1930 (Leftwich, et al., 2007a). Except for the barn, the structures were constructed between 1928 and 1948 (URS 2007a, p. ES-2). Ausra provided no information on the date at which the King farmstead was left unoccupied, but the dilapidated condition of the buildings suggests it has been unoccupied for some time.

While historic built-environment resources are still present at the King farmstead, and these constitute the built-environment component of that resource, the archaeological component of the King farmstead consists of structure foundations, subsurface features, artifact deposits, and earthwork features, as recorded over an area measuring about 620 feet (N–S) by 1,100 feet (E–W). At least one subsurface feature, described as an underground tank, was recorded (Leftwich, et al., 2007a). Mr. Leftwich did not evaluate the King farmstead, as an archaeological site, for CRHR eligibility. As to the integrity of the resource, Mr. Leftwich indicated the site condition was “fair,” with the observation that the “buildings are deteriorating” (Leftwich, et al., 2007a), which appears to address the integrity of the built-environment aspects of the resource, not the archaeological aspects.

Like the King farmstead, the Cavanaugh I farmstead is an unoccupied wheat-farming and cattle-raising complex surrounded by almost an entire section (640 acres) of fallow farm land. The Cavanaugh I farmstead is located in the eastern middle part of Section 33, at the end of a paved driveway running west from Highway 58. The complex consists of three residences, a mobile home, a barn-shop, various sheds, livestock and poultry shelters, an outhouse, water and fuel storage tanks, grain silos, derelict agricultural equipment and automobiles, and large trash piles consisting of what appear to be the remains of razed structures (lumber, sheet metal) and fencing wire. A collapsed underground septic tank was also identified in the Environmental Site Assessment as present in the complex (URS 2007a, p. 10). A satellite service area for cattle lies some 300 yards to the west, straddling the intermittent stream that meanders from the northwest to the southeast across Section 33, at the end of a dirt road that runs through the complex. The cattle service area consists of a corral on the southwest side of the stream, and, on the northeast side, a water trough, a windmill frame, a water tank on wheels, and piles of pipe and other debris.

Historically, Joseph and Mary Etna Cavanaugh acquired the Cavanaugh I farmstead in December, 1927. The earliest evidence for the construction of the farmstead's structures is their appearance on the 1952 U.S. Geological Service (U.S.G.S) "La Panza" 7.5-minute quadrangle map (Hollins 2007a), but the Environmental Site Assessment's historical data indicate that the Cavanaugh farmstead and outbuildings date between 1942 and 1945 (URS 2007a, p. ES-2). Again, Ausra provided no information on the date at which the Cavanaugh I farmstead was left unoccupied, but the dilapidated condition of the buildings suggests it has been unoccupied for some time.

While historic built-environment resources are still present at the Cavanaugh I farmstead, and these constitute the built-environment component of that resource, the archaeological component of the Cavanaugh I farmstead consists of structure foundations, subsurface features, and artifact deposits, as recorded over an area measuring about 620 feet (N–S) by 800 feet (E–W) for the main complex, and about 450 feet (N-S) by 450 feet (E-W) for the satellite cattle service area. These features and materials are mostly on the surface, but at least one subsurface feature, a septic tank is also present. Mr. Leftwich did not evaluate the Cavanaugh I farmstead, as an archaeological site, for CRHR eligibility. As to the integrity of the resource, Mr. Leftwich indicated the site condition was "fair," with the observation that the "buildings are deteriorating" (Leftwich, et al., 2007b), which appears to address the integrity of the built-environment aspects of the resource, not the archaeological aspects.

For both the King and Cavanaugh I farmsteads, based on the provided DPR 523 forms, staff believes their integrity as archaeological sites is excellent, with only rodent burrows and cattle trampling constituting disturbance of the surface and subsurface. The historic-period archaeological components at these sites are the material remains of two examples of a unique lifestyle in California: early-to-mid-twentieth-century dryland farming and cattle ranching in a transportation-challenged area. Occupied from 1928 until circa1995, and from 1942 until circa 1995, the archaeological components at these farmsteads contain data that could be used to address research questions regarding the changing integration of Carrizo residents in the regional economy, as both producers and consumers during the mid-twentieth century, and regarding the unique adaptation of Carrizo residents to their arid and isolated environment. Additionally, while the written record for these historic-period occupations is minimal, it is likely that family members and neighbors would be rich sources of oral historical information that could enhance and complement the archaeological data at these farmstead sites.

Consequently, staff recommends the archaeological components of the King and Cavanaugh I farmsteads as potentially eligible for the CRHR, under Criterion 4, as historic-period archaeological sites having the potential to yield information important in local and state history. They are the only archaeological resources identified in the proposed project's impact areas that are potentially eligible for the CRHR. Staff must therefore assess the proposed CESF project's impacts to them, and, if significant, recommend mitigation.

Ethnographic Resources Identified and Evaluated for Historical Significance

Ausra consultant Brent Leftwich's inquiries to the NAHC and to Native American groups and individuals resulted in the identification of no Native American ethnographic resources (CESF2007a*,* p. 5.7-26). Staff's communications with the representatives of the Northern Chumash Tribal Council and the Salinan Tribe indicate that these Native American groups regard the Carrizo Plain as special to California Native Americans and as a sacred area. Both representatives also expressed approval of some version of the project becoming certified. Neither representative specifically identified ethnographic resources for which staff would need to assess project-related impacts.

Mr. Collins, of the Northern Chumash Tribal Council, however, expressed a concern, which staff interpreted as related to Native American religious practices, regarding the light that would be directed upward during the proposed CESF project's operations, that could affect an observer's ability to see the sky and the nighttime view of the horizon (Collins 2008). This concern is addressed by other staff in the **Visual Resources** section of this PSA.

Built-Environment Resources Identified and Evaluated for Historical Significance

Previously and newly identified historic built-environment resources that could be impacted by the proposed CESF project are listed, and the information concerning them is summarized, in Cultural Resources Table 2. Discussion of these resources follows that table.

Cultural Resources Table 2
Built-Environment Resources That Could be Impacted by the Proposed Carrizo Energy Solar Farm Project

Resource Designation	**Type of Resource**	**Evaluator, Significance**	**Project's Physical Impact**	**Project's Visual Impact**
Previously Identified:				
None.				
Newly Identified by Ausra (CESF2007a, pp. 5.7-19–5.7-20):				
1. King Farmstead architectural component (in disuse)	Farming and ranching complex, 1928 to circa 1995.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	Resource would be demolished, but because the resource is not individually eligible for the CRHR, the impact would not be significant.	N/A
2. Cavanaugh Farmstead architectural component (in disuse)	Farming and ranching complex, 1942 to circa 1995.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	Resource would be demolished, but because the resource is not individually eligible for the CRHR, the impact would not be significant.	N/A
3. Carrisa Highway (Highway 58)	Main Carrizo Plain artery since 19th-century; alignment in project area dates to 1941.	Ausra: Resource is not individually eligible for the CRHR. Potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.

Resource Designation	Type of Resource	Evaluator, Significance	Project's Physical Impact	Project's Visual Impact
4. Morro Bay-Midway 230-kV Transmission Lines	Constructed by PG&E, 1943-1952.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	Interconnection loop-in.	None; CESF would be a compatible addition to setting.
5. Carrizo Plain Substation	Constructed by PG&E in 1948.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None; CESF would be a compatible addition to setting.
6. Filos Farmstead I (outbuildings) (in disuse)	Enclosed grain storage silos (dates to at least 1952), unenclosed grain storage silo (dates to at least 1966), grain elevator, and large Quonset hut (dates to at least 1966).	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.
7. Carrisa Plains School	Constructed in 1954; enlarged in 1962; still in use.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	Not significant due to distance from resource.

Resource Designation	Type of Resource	Evaluator, Significance	Project's Physical Impact	Project's Visual Impact
8. "Water Tank" (in disuse)	This probably is a bulk grain tank, not a water tank; dates to at least 1952.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.
Newly Identified by Staff and Recorded and Evaluated by Ausra:				
9. Wredon Farmstead (in use)	Farming and ranching complex, 1898 to present.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.
10. Coopers Farmstead (in use)	Farming and ranching complex, 1931 to present.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD. due to lack of integrity representing the landscape's Period of Significance.	None.	None.
11. Van Metre Farmstead (in disuse)	Farming and ranching complex, 1936 to present.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.

Resource Designation	Type of Resource	Evaluator, Significance	Project's Physical Impact	Project's Visual Impact
12. Lewis Farmstead (in use)	Farming and ranching complex, 1936 to present.	Not evaluated due to access restriction.	None.	None.
13. Travers Farmstead (in use)	Farming and ranching complex, 1936 to present.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.
14. Cavanaugh Farmstead II (in use)	Farming and ranching complex, 1934 to present.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.
15. Filos Farmstead II (in use)	Farming and ranching complex, 1942 to present.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.
16. "Red Tank" (in use)	Farming and ranching complex, 1936 to circa 1978.	Ausra: Resource is not individually eligible for the CRHR. Not a potential contributor to NCPCLHD due to lack of integrity representing the landscape's Period of Significance.	None.	None.

Resource Designation	Type of Resource	Evaluator, Significance	Project's Physical Impact	Project's Visual Impact
17. Northern Carrizo Plain Cultural Landscape Historic District	Based on a land-use pattern characterized by mechanized dryland wheat farming on large acreages in the period 1900-1967.	Staff: Resource qualifies as potentially eligible for the CRHR under Criterion 1, but lack of integrity renders it ineligible.	Yes, but because the resource is not eligible for the CRHR, impacts would not be significant.	Yes, but because the resource is not eligible for the CRHR, impacts would not be significant.

Individual Built-Environment Resources

Ausra's efforts to identify known historic-period built-environment resources, greater than 45 years of age and located within a one-mile radius of the proposed CESF project site, yielded no results. Their field work initially identified eight new potential historic-period built-environment resources (Numbers 1–8, in Cultural Resources Table 2), including farmsteads, infrastructure, and agricultural support structures, aged 45 years or more and located within a one-half-mile radius of the proposed project site. Staff's additional research identified a potentially CRHR-eligible cultural landscape, the Northern Carrizo Plain Cultural Landscape Historic District (NCPCLHD). The recognition of the latter cultural resource led staff to request that Ausra do archival and field research to gather historical and architectural data on an additional eight historic-period built-environment resources, aged 45 years or older, that staff considered potential contributors to the cultural landscape (Numbers 9–16, in Cultural Resources Table 2).

Ausra completed the additional research and provided information to staff on these new resources (CESF2008i, Data Response 101; CESF2008j, Data Response 101 and Attachment 2). Thus, with the addition of the cultural landscape, staff identified a total of 17 historic-period built-environment resources regarding whose CRHR-eligibility staff must make recommendations and project-related impacts to which staff must assess. These resources can be categorized as follows:

- 11 farmsteads
- 1 isolated agricultural infrastructure element (possibly not in its original location)
- 1 road
- 1 school
- 2 electrical transmission-related structures
- 1 dry-land farming cultural landscape (historic district).

The 11 farmsteads/agricultural infrastructure elements (Numbers 1, 2, 6, and 9–16, in Cultural Resources Table 2) and the isolated agricultural infrastructure element

(Number 8) as individual potential historical resources, can be considered typical, generally matching the description of the dry-land, wheat-farming complex of the Northern Carrizo Plain in the twentieth century up through circa 1970, as defined by Marijean H. Eichel, a historical geographer (Eichel 1971, p. 37):

> Most of the farmsteads were located well back from the road, with a dirt or gravel lane leading into the farmyard. A substantial house shaded by trees, a well and pumphouse, storage sheds, a gasoline tank and pump, a machine repair shop[,] and one or more smaller houses or bunkhouses comprised the typical farmstead buildings. The bulk [grain] tanks and an open space where trucks and farm machinery were stored completed the farmstead[,] which was generally square or rectangular in shape, and covered an extensive area.

Five of the identified agricultural resources (Numbers 1–2, 6, 8, and 11 in Cultural Resources Table 2) are in disuse, while seven (Numbers 9–10 and 12–16, in Cultural Resources Table 2) are still in use, although not all as operating farms. Ausra's architectural historian, Mr. Hollins, recommended all 11 farmsteads and the isolated agricultural infrastructure element as not individually eligible for the CRHR because none of them was associated with important historical events or persons (Criteria 1 and 2), or was representative of a style, type, or construction method (Criterion 3), or was capable of producing architectural data important in history (Criterion 4). In addition, Mr. Hollins assessed the integrity of the last eight farmsteads he recorded and evaluated (Numbers 9–16, in Cultural Resources Table 2) as insufficient for them to be contributors to the potential dry-land-farming cultural landscape staff had identified (Farmer 2007, Appendix D; CESF2008j, Attachment 2). Staff agrees that none of the 11 farmsteads, or the isolated agricultural infrastructure element, is individually eligible for the CRHR and that none retains sufficient integrity to be a contributor to the potentially CRHR-eligible NCPCLHD.

The Carrisa Highway (SR-58) (Number 3 in Cultural Resources Table 2) crosses the Carrizo Plain, running east-west, and is the principal paved road providing access to the plain. The road forms the southern boundary of the proposed CESF project site and the northern boundary of the project's proposed laydown-and-manufacturing area. The route originated as a nineteenth-century wagon road from Santa Margarita through Pozo, La Panza, and McKittrick (in Kern County) to the placer mines of the Sierra Nevada mountains. Its name and alignment have changed over time, as has the government responsible for its maintenance. The San Luis Obispo County Board of Supervisors in 1902 made it a public road and improved it between 1897 and 1907. It became a state highway in 1933, was paved for the first time in 1936, achieved its present alignment in 1941, and was designated State Highway 178 in 1943. The state returned the Carrisa Highway to San Luis Obispo County in 1954, and in 1964 the county designated it SR-58 (CESF2007a, pp. 5-23–5-24).

Ausra's architectural historian, Mr. Hollins, found in the Carrisa Highway's history and description no association of the road with any person important in history (Criterion 2), no representation in the road of a style, type, or construction method (Criterion 3), and no capacity for the road to yield information important in history (Criterion 4).

Additionally, Mr. Hollins noted that while the Carrisa Highway played a significant role in the history of transportation in eastern San Luis Obispo County, which staff believes could qualify it for CRHR-eligibility on the basis of Criterion 1 (association with events that have made a significant contribution to the broad patterns of our history), Mr. Hollins considered that the many modifications made to the road in the twentieth century impaired its integrity of design, materials, feeling, and workmanship too greatly for the road to convey its historical significance. Thus, Mr. Hollins recommended the road as ineligible for the CRHR. Staff agrees that, while Carrisa Highway could be eligible for the CRHR under Criterion 1, it retains too little integrity to be individually CRHR-eligible. However, staff has identified it as a contributor to the potentially CRHR-eligible NCPCLHD.

The two electrical transmission infrastructure resources that Ausra recorded and evaluated, the Morro Bay-Midway 230-kV transmission lines (constructed between 1943 and 1952) and the Carrizo Plain Substation (constructed in 1949) (Numbers 4 and 5 in Cultural Resources Table 2), are old enough to be potential historical resources under CEQA. PG&E built the transmission lines to convey hydropower from the Sierra foothills to central and southern California (CESF2007a, p. 5.7-24), but it also made distributed electricity available to Carrizo Plain residents for the first time. The substation was the first in the Carrizo Plain (CESF2007a, p. 5.7-24) and was the hub of the first Carrizo Plain electricity distribution system, consisting of the substation and lines of wooden poles extending out to the scattered farmsteads.

In his recordation Mr. Hollins described the supports of the Morro Bay-Midway 230-kV transmission lines as galvanized steel lattice towers, 35 feet tall. He noted in his DPR 523 form that while some individual towers had had barbed wire fences erected around their bases, the condition of the corridor (presumably that part Mr. Hollins was able to observe) is good, and that it has retained its structural integrity. The Carrizo Plain Substation was described in Mr. Hollins's DPR 523 form as consisting of structures composed of groupings of two, three, and four wooden poles, with the presence of anachronistic insulators and utility boxes noted. Repair and maintenance of the transmission line and substation were also noted.

Mr. Hollins found no association of either infrastructure resource with important historical events or persons, so he recommended that they were not CRHR-eligible under Criteria 1 or 2. He assessed both as typical and representative in their design and construction and well documented in California and the West, so he recommended they were not CRHR-eligible based on Criteria 3 or 4. He also indicated that the additions (barbed wire) and replacements (conductors on the transmission line, utility boxes at the substation, and insulators on both) reduced the integrity of design, integrity of materials, integrity of setting, and integrity of feeling of these resources (CESF2007a, p. 5.7-24; CESF 2008e, pp.3–4). Staff disagrees.

While staff believes that without having more historical data on the Morro Bay-Midway 230-kV transmission lines and the Carrizo Plain Substation, definitive determinations on their eligibility for the CRHR are not possible, staff recommends that both of these two electrical distribution resources could be individually eligible for the CRHR under Criterion 1 (association with events that have made a significant contribution to the broad patterns of our history), at the local level of significance for their role in bringing

distributed electricity to the Carrizo Plain. Additionally, at the state-wide level of significance, staff believes that the Morro Bay-Midway 230-kV transmission lines could be potentially eligible for the CRHR because the resource appears to be an early component of California's post-WWII infant electrical grid. The potential Period of Significance for these two resources would tentatively be the 1950s. Having recommended the two resources as potentially CRHR-eligible, staff also has to consider their integrity.

The standards for integrity for a resource considered CRHR-eligible under Criterion 1 are less stringent than the standards of integrity for a resource considered CRHR-eligible under Criterion 3. Thus the integrity of design, integrity of materials, integrity of setting, and integrity of feeling of the Morro Bay-Midway 230-kV transmission line and the Carrizo Substation are not significantly impaired by the barbed-wire additions to the towers and the replaced insulators and utility boxes at the substation. This is true because these alterations do not interfere with an observer perceiving these resources as the system that brought electrification to the Carrizo Plain in the 1950s, so despite the alterations, these resources are still capable of conveying their significance. Moreover, the alterations are reversible, should restoration of these resources ever be desired. While staff recommends these resources as potentially individually eligible for CRHR, staff did not consider them to be contributors to the potentially CRHR-eligible NCPCLHD.

The Carrisa Plains School (Number 7 in Cultural Resources Table 2) was identified by Mr. Hollins, Ausra's architectural historian, as a potential cultural resource subject to CESF project impacts because it is older than 45 years and is located near the proposed project's laydown parcel. The school was completed in 1954 and opened in 1956. It is a one-story, stucco and masonry-clad, low-gable-roofed, contemporary-style building, L-shaped in plan. It houses two classrooms, an all-purpose room, and a kitchen, with a tennis court and a playground adjacent. South of the school is a duplex residential unit built at the same time as the school to serve as a teacherage. In 1962, a shed-roofed auditorium was added to the school (Farmer 2007a, p. 6-7).

Mr. Hollins found no association of the Carrisa Plains School with any person important in history (Criterion 2), no representation in the school of a style, type, or construction method (Criterion 3), and no capacity for the school to yield information important in history (Criterion 4). Additionally, Mr. Hollins noted that while the Carrisa Plains School continues a long tradition of placing great value on education in the Carrizo Plain community, the construction and operation of the school has not played a significant role in San Luis Obispo County history, California history, or American history. Mr. Hollins also considered that the addition of the auditorium impaired the school's integrity of design. Thus, Mr. Hollins recommended the Carrisa Plain School as not individually eligible for the CRHR (DPR 523 form in App. D). Staff agrees, and adds that this resource is not a potential contributor to potentially CRHR-eligible NCPCLHD.

Landscape Characteristics of the Northern Carrizo Plain Cultural Landscape Historic District

Rural historic landscapes possess tangible features, called landscape characteristics, which represent patterns of human usage and demonstrate the interaction between

economic activity and the natural environment. These features would be present during the cultural landscape's Period of Significance, which staff has defined for the NCPCLHD as 1900 to 1967, encompassing the period from the introduction of mechanization that made large-scale dry farming economically feasible to the federal imposition of agricultural regulations limiting wheat growing that caused the subsequent decline and abandonment of the industry.

Land Uses and Activities

The principal land use in the Carrizo Plain for the first half of the twentieth century was the large-scale dry farming of milling (hard) wheat. Wheat farming was the most important economic activity in the plain during this period. The plain is one of the few areas in California where this specific type of agricultural activity was feasible (Supernowicz 1991, p. 13). Prior to the introduction of wheat cultivation, the area was characterized by cattle ranching, an activity that continued in conjunction with wheat farming, although in a subsidiary role. During the sixty years of a dominant wheat economy, earlier homesteads and small-scale agricultural holdings were absorbed into the dominant wheat farms. Although the plain was always sparsely populated, the wheat-farming economy and land use established a distinctive pattern of settlement, with widely separated farmsteads occupied by operators who owned and leased land for their crop.

The extensive use of the plain for wheat growing substantially altered the physical environment of the area. The large acreage needed for successful wheat cultivation resulted in a pattern of extensive open fields, often extending over several thousand acres of adjacent land and often held in parcels consisting of entire sections or half-sections. Years of plowing and leveling have removed the gentle natural undulations of the land and erased trails and other features that followed topographical contours. Wheat farming has left a largely geometric stamp on the land.

Patterns of Spatial Organization

The spatial organization of the Carrizo Plain area is characterized by huge expanses of treeless agricultural fields and widely spaced, isolated farmsteads. A 1941 agricultural map (San Luis Obispo County 1941) documents eight farmsteads in an approximately 20,000 acre area. Generally, the farmsteads are set back from the main roads at the end of drives leading to the house and agricultural buildings. A cluster of community services was historically located in Simmler (sections 34 and 36 in T 29S R18–19 E) and consisted of a 1954 school, a 1910 school and associated teacher's house, and the site of the regional post office.

Response to the Natural Environment

The Carrizo Plain is an enclosed structural basin that lies at an altitude of approximately 2,000 feet (Eichel 1971, p. 1). It is an essentially flat plain, approximately 10 miles wide, enclosed all around by mountains. The area is heavily faulted and has an entirely interior drainage pattern. The topsoil has an underlayment of hardpan approximately four feet below the surface. Soda Lake in the south-central portion of the basin is a large, shallow body of water with a high sodium sulphate content. Temperatures in the summer can reach 100 degrees or more, with winter temperatures that fall below freezing. There is very little rainfall. These conditions, while relatively harsh, are well

suited to the raising of drought-resistant hard spring wheat. Wheat of this type is planted in the fall and requires cold winters. It also has deep roots which are able to reach the water which is trapped by the underlying caliche layer found in the basin (Eichel 1971, p. 1; Supernowicz 1991, p. 2). The flat, treeless plain also invited mechanized agriculture based on large open fields. The natural environment of the Carrizo Plain basin did not necessitate clearing trees or other obstacles to the plow.

Cultural Traditions

There are no known ethnic, cultural, or religious traditions that shaped economic activity or land use patterns in the Carrizo Plain.

Circulation Networks

The principal transportation corridor of the Carrizo Plain is Highway 58, an east-west road that connects the basin to San Luis Obispo to the west and to Interstate 5 and McKittrick to the east. This route dates to the 1890s when it was constructed as a part of a county public works program (Eichel 1971, p. 22). Within the basin the highway follows or connects to section lines and displays no topographically influenced alignment. This road was the major trucking route during the wheat harvesting season, with heavy-duty trucks making a continuous circuit between the farms and the McKittrick railroad yard, and so is a key element of the NCPCLHD. Other major roads in the basin, such as Bitterwater Road, exhibit a similar section line orientation.

As late as the 1940s a large number topographically oriented roads and trails meandered throughout the northern plain. The 1941 Natural Resources Map clearly shows a number of examples of this type of circulation element leading to farmsteads, fields, and grazing areas. However, Marijean Eichel, in her history of the plain, notes that from the 1940s to the present many of the topographically aligned roads and trails have disappeared (Eichel 1971, pp. 34–35). An examination of the 1955 and 1954 USGS maps verifies her observation, with just a few of the roads that were present on the 1941 map still in existence by the mid-1950s. Most public roads and farmstead entry roads are now characterized by straight, section line alignments and right angle turns. Eichel attributes this change to the impact of mechanized wheat farming in leveling the natural topography of the land and favoring the straight property boundaries as guidelines for plowing.

Boundary Demarcations

Boundary demarcations are visible in the field pattern lines in aerial photographs. During the dominant wheat-growing period, fields were fenced to prevent cattle from wandering into cultivated fields. Many of these fences are still present, but are not maintained where cultivation has ceased. The most common fence types are wood post with barbed wire and metal post with barbed wire.

Many of the contemporary “ranchettes” (see below) in the valley are demarcated with fencing of various types, but these fences originated outside the Period of Significance and are not associated with the rural wheat growing landscape.

Vegetation Related to Land Use

Vegetation related to historic land use consists of cultivated fields of wheat or other grain crops, most frequently today, barley. Alternatively, where land has been allowed to remain fallow or revert to grazing, vegetation consists largely of European naturalized grasses. In the vicinity of wheat-farming farmsteads, the most notable introduced vegetation consists of exotic trees planted for shade and as windbreaks. Other exotic vegetation includes lawns, shrubs, and decorative plantings.

Buildings, Structures, and Objects

The majority of buildings and structures in the Carrizo Plain occur in the context of wheat-farming farmsteads with some outlying water storage facilities and power facilities. The typical farmstead included not only the farm operator's residence, but most of the buildings and structures needed to operate the ranch. These usually included, in addition to a main house, a well and pump house, a barn or barns, storage sheds, a gasoline tank and pump, a machine repair shop and housing for farm hands. Introduced windbreak and shade trees are a striking aspect of the farmsteads which, on the otherwise treeless plain can be seen at great distances marking the location of farms or former farms.

In addition to these typical farm structures, the wheat farms of the Carrizo usually included some specialized structures, specific to the production and marketing of wheat crops. The most common of these were the bulk tanks, conical-shaped holding tanks of corrugate metal that were used to store newly harvested wheat until it could be trucked away. Often in conjunction with these holding tanks, there are conveyor belts, or elevator lifts, and elevated loading platforms. Quonset hut metal buildings also occur with some frequency. Most of these structures are located within the general confines of the farmstead, but also can be located at a short distance from the farm residence and its surrounding landscape. In a few cases, such as the Filos I property, harvest-related facilities such as platforms and tanks occur in isolation.

There are 11 historic farmsteads located within the study area. These farmsteads were established prior to 1955 and originally each functioned as the center of a wheat farming enterprise. In some cases the farmsteads also contain buildings and structures related to cattle-raising. In T29S R18E, these farmsteads include Cavanaugh I (section 33), King (section 28), Filos I (section 21), Filos II (section 22), and Wreden (section 11). In T29S R17E, the Coopers (section 24), Van Metre (section 24), and Lewis (section 30) properties are located. In T30S R18E, the Travers (section 4), Cavanaugh II (section 1), and Red Tank (section 3) properties are found.

School buildings occur in the vicinity of Simmler, along Highway 58, but they are not contributors to the potentially CRHR-eligible NCPCLHD. The Carissa Plains School lacks integrity for the Period of Significance of the potentially CRHR-eligible NCPCLHD. The 1910 Craftsman-style school building, on Highway 58 next to the San Luis Obispo County Road Maintenance Section 5 facility, is presently used as a community center and lacks integrity for the NCPCLHD Period of Significance. No other public or commercial facilities are located within the plain.

Two infrastructure elements, a pair of power transmission lines (Morro Bay-Midway 230-kV lines) and a power distribution substation (Carrizo Plain Substation) occur in the northern plain, both dating from the late 1940s. Although built within the NCPCLHD Period of Significance they are not directly related to the dry-farming agricultural production of the area, which was well developed prior to electrification of the plain. They may be significant within the context of rural electrification in San Luis Obispo County, but they are not important in an agricultural context.

Objects include abandoned historic farm machinery that is seen near farmsteads, or displayed in open fields. The most extensive example of this is at the interpretive facility for the Carrizo Plain National Monument in the southern portion of the plain.

Clusters

The major clusters within the northern Carrizo Plain are the farmsteads (discussed above under Buildings, Structures, and Objects) and the grouping of school buildings along Highway 58. No other clusters of community, religious, or other facilities are present.

Archaeological Sites

The Carrizo Plain is an area of extensive and important Native American sites, many of which are located within the southern part of the plain within the National Monument. These prehistoric sites, while a part of the cultural landscape of the plain, are not related to the context of historic-period wheat farming. The archaeological components staff identified at the King and Cavanaugh I farmsteads, however, are potentially CRHR-eligible historic archaeological sites associated with the wheat-ranching era of the northern Carrizo Plain.

Small-Scale Elements

Small-scale elements are generally isolated historic elements, such as foot bridges or signs, that contribute to the historic landscape of an area. There are no distinctive or recurring small-scale elements associated with the historic landscape of wheat growing in the northern Carrizo Plain.

Significance of the Northern Carrizo Plain Cultural Landscape Historic District

Based on historical research and an analysis of the component elements of a rural historic landscape, there is a rural historic landscape associated with the dry farming/wheat production in the Carrizo Plain. The NCPCLHD is significant in the history of San Luis Obispo County agriculture and possibly in the history of California agriculture, as well. This rural historic landscape is eligible as a historic district for listing in the CRHR under Criterion 1; association with events or patterns of development important in local or regional history. The dry-farming, wheat-growing economy that developed in the Carrizo Plain in the early twentieth century was unique in San Luis Obispo County and possibly in California. The Period of Significance extends from 1900 to 1967. This encompasses the period from the introduction of mechanization that made large-scale dry farming economically feasible to the federal imposition of agricultural regulations limiting wheat growing that caused the subsequent decline and abandonment of the industry.

Major elements that define this historic landscape include farmstead clusters of buildings, structures, and landscaping that continue to be present in the northern Carrizo Plain. These are associated with the wheat-growing industry and date from the Period of Significance. Of the 11 farm sites within the study area, 8 date to 1941 or earlier, and at least 2 others originated in the 1950s. The land use pattern and spatial organization of the plain when viewed in aerial photographs still reveals a distinctive, large-scale, leveled field pattern, particularly in the northern part of the basin. A geometric circulation pattern related to section lines that evolved during the wheat-growing era is still largely in place. Highway 58, the principal transportation corridor for the plain and crucial to the movement of wheat crops to market, retains the alignment associated with the plain's peak wheat production period, although not its original width and surfacing. The cluster of community services along the highway, specifically the schools and teacher's residence, and possibly the post office, are still intact. A significant number of resources, as well as the larger pattern of land division and use, continue to reflect the period of large-scale historic wheat-growing in the plain.

In addition to meeting one or more of the criteria for listing in the CRHR, a property must retain integrity to be eligible. Integrity is defined as the ability of a resource to convey the reasons for which it is considered historically significant. The NPS has defined seven aspects of integrity to aid in determining if a property is sufficiently intact and authentic enough to convey its historical significance. These aspects of integrity include location, setting, materials, design, workmanship, feeling and association. While some change in historic resources over time is inevitable, a property or landscape needs to retain its essential appearance and character from its Period of Significance. NPS rural landscape guidance lists the types of changes and alterations that specifically might impair the integrity of rural landscapes (McClelland 1999, p. 11), including:

- Widening and resurfacing of roads;
- Changes in land use;
- Introduction of non-historic uses;
- Loss of vegetation related to historic land use;
- Relocation, removal and/or alteration of historic building;
- New construction; and
- Loss of boundary demarcation

Although the imprint of dry-land wheat cultivation is still apparent within the northern Carrizo basin, a number of changes in the past forty-five years have impaired the integrity of several aspects of the rural historic landscape.

One of the most important character-defining features of the NCPCLHD is the presence of a small number of widely separated farmsteads that are marked by introduced tree plantings that visually stand out for many miles. Within the study area, all but one (the Red Tank property) of the farmsteads associated with historic wheat farming retain some of the characteristic components of a farmstead of the wheat-producing era. To one degree or another, most of the properties contain residences, silos or conical

holding tanks, sheds, barns, and landscaping that date from the 1920s through the mid-twentieth century. These properties could contribute to a CRHR-eligible rural historic landscape that is historically important within the context of regional wheat farming.

A majority of these properties, however, have undergone substantial changes with the removal of historic buildings and the addition of a number of modern structures, built after the Period of Significance, which are related to changed patterns of land use and production. While the Coopers, King, and Cavanaugh I residences retain much of their farmhouse appearance from the wheat-growing era, residences at all the other farmstead properties have been extensively altered by additions and changes in materials. This includes the principle residence at the Wreden, Lewis, Filos II, and Cavanaugh II properties. In the case of the Van Metre property the abandoned house has fallen into severe disrepair such that it has lost many of its character-defining features. Buildings and structures specific to wheat-growing are present on all of the remaining farmsteads, except the Red Tank property. Wheat-holding tanks, elevated loading platforms, and conveyor belts are still found at the Wreden, Van Metre, Cavanaugh I and II, and the Filos I and II properties. Barns are found at Wreden, Van Metre, Lewis, and Cavanaugh II. Metal Quonset huts are located at the Filos I, Wreden, and Travers properties. A bunk house is present at the Cavanaugh II property. Deterioration, due to abandonment, has taken a toll on many of the tanks and loading platforms with their associated conveyor belts. Many are missing roofs and portions of siding. This is particularly the case at the Filos I and II, Cavanaugh I and II, and the Van Metre properties. Of the few remaining barns, several have either collapsed (Cavanaugh I), are in the process of collapsing (Van Metre) or have experienced substantial modernization and additions (Cavanaugh II).

While several types of wheat-farming buildings and structures have suffered a loss of individual integrity in materials, design, and workmanship as a result of deterioration, they also have lost many of their original rural historic landscape characteristics due to building removal and the introduction of new buildings and structures related to current land use. Architectural historian Jeremy Hollins traced building removal using historic USGS maps and found a large number of buildings from the Period of Significance have been removed since 1967. Large equipment and hay storage pole barns, multiple sheds, and new residences have been introduced at several of the properties and are the most common types of intrusion. These elements have disrupted the original spatial organization, circulation patterns, cluster organization, and boundary demarcations of the farmsteads. Only the Cavanaugh, King, and Filos I properties, all of which are abandoned, retain strong evidence of these rural landscape characteristics. For the other properties the original relationship among buildings and structures associated with wheat-farming is no longer clear and well defined. However, the characteristic vegetation pattern of introduced shade and wind-break trees in and around the farmsteads continues to be present.

The large square and rectangular field pattern that characterized wheat-farming remains intact in some sections. It is most apparent in fields furthest removed from the Highway 58 corridor. In sections 7, 16, 17, 18, 19, 20, 21, 22, 27, 28, and 29 of T29S R18E, and in sections 2, 3, and 5 of T30S R18E, and the southern portion of section 6, T 30S R18E, a cultivated field pattern is still observable in aerial photographs. This represents

approximately 29 per cent of the land once in wheat cultivation. Other land has reverted to grass or no longer displays evidence of plowing, cropping, or harvesting. Although still perceptible in some locations, the overall continuity of the land use and spatial organization of fields has been lost.

In the past several decades the introduction of parcel subdivision to create small, 20–40-acre, semi-rural residential lots has been very disruptive of traditional land use and settlement patterns. Sometimes known as “ranchettes,” a property category defined by the American Farmland Trust as a residential property on a large lot (1.5 acres or more) that is located in a rural area, this form of development is well established along the Highway 58 corridor. It is particularly evident in the western portion of the basin in sections 19, 29, and 30 of T 29S R18E. On the eastern side of the study area near Simmler the highway corridor remains rural in appearance, but the County Assessor records indicate that the land has been heavily subdivided, although not yet developed. Outside the study area, the California Valley subdivision, established in the 1960s, imposes a street grid and ranchette development pattern immediately to the east. Although never fully developed, California Valley is a large, non-historic, exurban grid that intrudes between the northern Carrizo Plain rural historic landscape area and the former agricultural and ranch land in the National Historic Monument to the south. Although the number of ranchettes is not large, they now substantially outnumber the original farmsteads within the study area and are highly visible in the open treeless plain.

Although the Carrizo Highway retains the general alignment associated with the plain’s peak wheat production period, it has been improved, widened, and resurfaced many times. The same also is true of other main roads such as Bitterwater Road and Soda Lake Road, as well as other unnamed section line roads.

The NCPCLHD retains several elements of its rural historic past, but it exhibits a number of changes that the NPS guidelines identify as factors that diminish the integrity of a rural historic landscape. In the case of the northern Carrizo Plain these include widening, resurfacing and loss of historic roads, changes in land use accompanied by loss of defining field patterns, loss of vegetation related to historic land use (i.e., wheat cultivation), loss of integrity in individual historic farmsteads through changes and alterations, introduction of land subdivision and new construction, and a loss of traditional boundary demarcation fencing.

In summary, the northern Carrizo Plain exhibits characteristics of a rural historic landscape associated with dry-land wheat production in the period from 1900 to 1967, but this landscape lacks integrity in essential aspects. Due to a loss of integrity, the rural historic landscape of the northern Carrizo Plain is not eligible for listing as a historic landscape district in the CRHR.

Among the 17 built-environment resources considered for CRHR eligibility, staff recommends that only the two electrical distribution resources, the Morro Bay-Midway 230-kV transmission lines and the Carrizo Plain Substation, could be individually eligible for the CRHR under Criterion 1 (association with events that have made a significant contribution to the broad patterns of our history), at the local level of significance, and the Morro Bay-Midway 230-kV transmission lines could also be eligible at the state level

of significance. Thus, staff must evaluate CESF project-related impacts to these two resources and possibly recommend mitigation if unavoidable and significant adverse impacts are identified.

Summary of CRHR-Eligible Cultural Resources the Proposed Project Could Impact

From its consideration of all types of cultural resources that the construction and operation of the CESF project could impact, staff recommends two historic-period archaeological sites and two built-environment infrastructure resources as potentially eligible for the CRHR. These resources are:

- The archaeological component of the King farmstead;
- The archaeological component of the Cavanaugh I farmstead;
- The Morro Bay-Midway 230-kV transmission lines; and
- The Carrizo Plain Substation.

For these resources, staff must assess the proposed CESF project's impacts to them, and, if staff finds any impacts significant, provide mitigation.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Various laws apply to the evaluation and treatment of cultural resources. CEQA requires the Energy Commission to evaluate resources by determining whether they meet several sets of specified criteria. These evaluations then influence the analysis of potential impacts to the resources and the mitigation that may be required to ameliorate any such impacts.

The CEQA Guidelines provide a definition of a historical resource as a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of Section 5024.1 (g) of the Public Resources Code," or "any object , building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record." (California Code of Regulations, Title 14, section 15064.5(a)). Historical resources that are automatically listed in the CRHR include California historical resources listed in or formally determined eligible for the NRHP and California Registered Historical Landmarks from No. 770 onward (Public Resources Code, Section 5024.1(d)).

Under the CEQA Guidelines, a resource is generally considered to be historically significant if it meets the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years

old,[2] a resource must meet at least one (and may meet more than one) of the following four criteria (Public Resources Code section 5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (California Code of Regulations, Title 14, section 4852(c)).

Even if a resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows the lead agency to make a determination as to whether the resource is a historical resource as defined in Public Resources Code sections 5020.1 (j) or 5024.1. Whether a proposed project would cause a substantial adverse change in the significance of historical resources is the issue that staff analyzes to determine if the project may have a significant effect on the environment. The significance of an impact depends on:

- The cultural resource impacted;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and
- How much the impact will change those integrity appraisals.

DIRECT/INDIRECT IMPACTS AND MITIGATION

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic built-environment resources when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when

[2] The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a potential five-year lag in the planning process.

the new structures produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility and vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed power plant site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact previously unidentified archaeological resources. The potential direct, physical impacts of proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into a particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby built-environment resources.

Direct Construction Impacts and Proposed Mitigation

Staff has identified CESF project-construction impacts to known cultural resources and anticipates that project construction could also include potentially significant impacts to as-yet-unidentified CRHR-eligible archaeological deposits. The proposed project's impacts to known cultural resources would include:

- Significant disturbance of known, intact, potentially CRHR-eligible, historic-period archaeological deposits consisting of the archaeological component of the King farmstead and the archaeological component of the Cavanaugh I farmstead; and
- Non-significant degradation of the integrity of materials and integrity of design of the potentially CRHR-eligible Morro Bay-Midway 230-kV transmission lines, during looping in for interconnection.

To reduce the project's significant impact to the two known historic-period archaeological sites to below the level of significance, staff proposes Condition of Certification **CUL-8**. **CUL-8** would require the project owner to hire a qualified historical archaeologist to write and implement an Energy-Commission-approved testing and data recovery plan for the potentially CRHR-eligible archaeological components of the King farmstead and the Cavanaugh I farmstead. **CUL-8** is intended to determine whether these two resources have the potential to yield information important in history (CRHR Criterion 4) and, if so, to recover that information prior to construction of the project. This condition would be implemented post-certification because of the need for demolition of the extant structures prior to archaeological testing and possible data recovery.

Staff has identified significant CESF project-construction impacts to known archaeological resources and anticipates that project construction could also include potentially significant impacts to as-yet-unidentified CRHR-eligible archaeological deposits. The proposed project's impacts to known cultural resources would include the

disturbance of known, intact, CRHR-eligible, historic-period archaeological deposits consisting of the archaeological component of the King farmstead and of the archaeological component of the Cavanaugh I farmstead.

The proposed project's potential impacts to as-yet-unidentified archaeological resources are not known, but the potential for damage to such resources from construction-related ground disturbance is foreseeable. Construction generally entails the subsurface disturbance of the ground, which can affect unidentified archaeological resources that could be CRHR-eligible under Criterion 4 ("likely to yield information important in history or prehistory"). Ground disturbance accompanying foundation excavations at the proposed CESF plant site and laydown area, and for the proposed new interconnection transmission line, has the potential to directly impact buried archaeological resources, unidentified at this time.

The proposed CESF construction activities that involve ground disturbance would primarily entail excavations (trenches and foundations) for equipment, transmission line poles, array controls and water supply, and a sewage system. The greatest excavation depth from the surface anticipated by Ausra is 30 feet, for the footings of the new transmission line poles. Most excavation depths on the plant site are estimated to range from 2–4 feet from the surface (CESF2008n, Data Response 118). No additional off-site areas would be needed for either borrowing imported soils or disposing of unsuitable on-site soils, so ground disturbance would be limited to the proposed project site, laydown area, and interconnection transmission line route (CESF2007a, p. 3-29). Ausra's geotechnical study identified the uppermost 2–4 feet of the plant site's soils as having been disturbed by disking or other mechanical impacts (URS 2007b, pp. 2-1–2-2, 3-3). Thus the proposed project's potential impacts to as-yet-unidentified archaeological deposits would arise from disturbance of previously undisturbed native soils at the CESF plant site, laydown site, and interconnection transmission line route that could be encountered during excavations for footings and foundations in excess of three feet, on average, below the surface.

Ausra recognizes the possibility that intact prehistoric archaeological deposits could be present in undisturbed native soils (assumed to lie four feet below the present surface) on the proposed CESF project and laydown sites (CESF2007a, p. 5.7-29), and staff agrees with this assessment. Because of the possibility that prehistoric archaeological deposits could be encountered during project excavations, CEQA advises a lead agency to make provisions for archaeological resources unexpectedly encountered during construction-related ground disturbance, and the project owner may be required to train workers to recognize cultural resources, fund mitigation, and delay construction in the area of the find (Pub. Resources Code, § 21083.2; Cal. Code Regs., tit. 14, §§ 15064.5(f) and 15126.4(b)). Consequently, staff recommends that procedures for identifying, evaluating, and possibly mitigating impacts to newly discovered archaeological resources be put in place through conditions of certification to reduce those impacts to a less-than-significant level.

To that end as well, Ausra has suggested measures intended to identify and mitigate potential impacts to archaeological resources that could be discovered during the

construction-related ground disturbance of the proposed CESF project, including the following (CESF2008a, pp. 5.7-29–5.7-32)[3]:

> Archaeological Monitoring
> The archaeological monitor shall be equipped with a cellular telephone to ensure rapid communication with URS senior cultural resources staff to promptly report any cultural finds or discuss any problems as they are encountered in the field. Archaeological monitors shall keep a daily monitoring log of construction activities, observations, types of equipment used, problems encountered, and any new archaeological discovery (including the cultural material observed and location). Photographs shall be taken as necessary to supplement the documentation. These logs shall be signed and dated by the archaeological monitor and included within the monitoring report. The archaeological monitor shall monitor all ground-disturbing activities within the project site and construction laydown area. The archaeological monitor will be authorized to temporarily halt ground-disturbing activities in the immediate vicinity of a discovery in the event that cultural resources are uncovered during construction. Similarly, if the construction staff or others identify cultural resources during construction activities, they shall halt construction in the immediate vicinity, and immediately notify the archaeological monitor and project supervisor. The archaeological monitor shall then immediately notify URS senior cultural resources staff. The archaeological monitor shall use flagging tape to delineate the area of the find and protect the resources from construction activities. Construction activities shall not take place within the delineated discovery area until the archaeological monitor, in consultation with URS senior cultural resources staff and the Energy Commission, can inspect and evaluate the significance of the find and implement mitigation measures, if needed. During this time, construction activities may be redirected to other areas outside of the flagged area.
>
> Monitoring Documentation
> After all ground-disturbing activities are complete, a cultural resources compliance monitoring report shall be prepared by URS cultural resources staff. The report shall include the daily monitoring logs as an appendix. The report shall also include the level of effort involved in monitoring cultural resources, a description of activities monitored, and the number and types of new cultural resources discoveries, including assessment and treatment action.
>
> Native American Monitoring
> CUL-5: In order to ensure participation by interested members of the Native American community, it is recommended that a Native

[3] These measures, distinguished by insetting, are quoted verbatim, except for editing to match Energy Commission style guidelines.

American monitor be present during archaeological testing and/or data recovery for cultural resources that appear to have a prehistoric or ethnographic component. The monitor will be retained either directly by the applicant or by the consultant conducting the actual fieldwork.

[Salinan Tribal Council Traditional Lead John Burch commented on this mitigation measure proposed by Ausra. Mr. Burch indicated that in the second line, “a Native American Monitor,” should instead read, ”an indigenous Native American Monitor.” Also, in the third line, after “cultural resources,” Mr. Burch indicated that “and during all construction activities” should be inserted (Burch 2008d).]

Avoidance

In the event cultural resources are encountered prior to or during construction activities, including subsurface excavation, construction activities in the immediate vicinity of the identified resource shall be halted and a qualified archaeologist shall identify the nature and boundary of the finds and assess whether the proposed activities will impinge upon a cultural resource. Routes of any access roads that must be built or graded that are outside of areas previously surveyed for cultural resources will be subjected to archaeological survey prior to construction. In the event the resource is identified as a potentially significant cultural resource, planned construction activities shall be modified to avoid the resource if feasible. If it is not feasible to avoid the resource, the archaeologist shall identify the proper course of testing, excavation, recovery, and documentation to be undertaken in order to reduce project related impacts to a less than significant level. In the event that archaeological resources are discovered during the course of construction, activities related to the proposed project, grading, and/or excavation activities within 100 feet of the potentially significant resource should be monitored by a qualified archaeologist.

Preconstruction Assessment and Construction Training

A qualified professional archaeologist shall be retained to monitor all ground-disturbing activities associated with the project. Ground-disturbing activities include clearing, grubbing, grading, and trenching within the project site and construction laydown area. The archaeological monitor shall visit the project prior to commencement of construction activities to become familiar with site conditions. The archaeological monitor shall attend the pre-construction meeting and work with the County of San Luis Obispo, the client, and construction management staff to suspend or redirect construction activities if cultural materials are encountered. The archaeological monitor shall also provide training to appropriate construction personnel on the site to explain the

importance of and legal basis for the protection of significant archaeological resources.

Physical Demarcation and Protection

In instances where a project facility must be placed within 100 feet of a known cultural resource previously found eligible for inclusion on CRHR, the cultural resource will be temporarily fenced or otherwise demarcated on the ground, and the area will be designated environmentally sensitive. Construction equipment will be directed away from the cultural resource and construction personnel will be directed to avoid entering the area. Where cultural resource boundaries are unknown, the protected area will include a buffer zone with a 100-foot radius. In some cases, additional archaeological work may be required to demarcate the boundaries of the cultural resource to ascertain whether the cultural resource can be avoided.

Resource Recordation and Evaluation

The archaeological monitor shall follow accepted professional standards in recording any discovery and shall submit applicable Department of Parks and Recreation forms to the CCIC [Central Coast Information Center]. If the discovery is deemed not significant by URS senior cultural resources staff, construction activities may proceed. Should a potentially significant cultural resource be encountered during monitoring, evaluation of this resource to determine significance will be required. Significant cultural resources impacted by the project would require additional mitigation, which may include data recovery. A recovery of a sample of the deposit from which the archaeologist can define scientific data to address archaeological research questions is considered an effective mitigation measure. A mitigation plan shall be prepared and carried out by URS cultural resources staff. The mitigation program shall be carried out as quickly as possible to avoid construction delays. Construction may resume on-site as soon as the field data collection phase of any data recovery program is completed.

Provision for Encountering Human Remains

Human remains are not anticipated within the project given the absence of a prehistoric deposit. If human remains are encountered, construction activities shall be immediately halted in the immediate vicinity of the discovery. The project supervisor shall immediately contact the county coroner, and the applicant. If the remains are Native American, the NAHC [Native American Heritage Commission] shall be contacted. The NAHC is required to determine the most likely descendant, notify that person, and request that they inspect the burial and make recommendation for treatment and removal.

Laboratory Analysis and Curation

Cultural material removed during the course of monitoring or other mitigation measures shall be bagged and catalogued in the field, and analyzed in the laboratory. Cultural materials shall be analyzed in order to characterize the resource(s) and their association to existing regional chronologies. The materials, and the contexts from which they were sampled, shall also be evaluated with regard to the eligibility criteria for inclusion on the CRHR.

The objectives of laboratory processing and analysis are to determine to the extent possible the date, function, cultural affiliation and significance of the archaeological sites, and to prepare artifacts for permanent curation. Artifacts shall be processed (i.e., cleaned, catalogued, and analyzed) according to the Secretary of the Interior's Standards and Guidelines for curation (36 CFR 79). Artifacts shall be gently washed using tap water and a soft toothbrush. Delicate and/or unstable materials, such as decayed metal and organic material, shall be carefully dry-brushed with a soft toothbrush. After drying, artifacts shall be analyzed, catalogued, and rebagged according to provenience and type. Artifacts shall have acid-free paper labels with full provenience information, including the state site number, catalog number, shovel test pit or test unit number, stratum, and date. All artifact information shall be entered into a customized computer-based application.

Historic artifacts shall be cataloged according to group, material, and type, generally based on Stanley South's classifications (1977). South's artifact groups consist of:

- Architecture—construction material and decoratively functional (e.g., doorknobs or moldings) elements used in a building;
- Clothing—any part of clothing, from a whole garment to a fragment of cloth, a single bead, or a button, as well as sewing items such as a needle or thimble;
- Furniture—furniture hardware and other furniture parts;
- Kitchen—items used primarily in the kitchen, such as glass, ceramics, stove parts, and food remains;
- Personal—small items belonging to one person, such as coins, hygiene products, and jewelry;
- Arms—gun parts and ammunition;
- Tobacco—items used to smoke tobacco; and
- Activities—items used to perform an act, such as hardware, toys, transportation, construction, and recreation.

> All artifacts, monitoring logs, and photographs are the property of the client and shall be placed in appropriately labeled boxes for temporary storage at URS. As part of mitigation requirements, final curation shall be at the University of California, Santa Barbara Department of Anthropology and funded by the client.

Although staff concurs with many of Ausra's suggested mitigation measures, staff proposes to add further recommendations or to expand upon Ausra's suggestions to ensure that all impacts to cultural resources are mitigated to below the level of significance. Ausra's suggested mitigation measures and staff's additional recommendations are incorporated into staff's proposed Conditions of Certification **CUL-1** through **CUL-7**, below. These measures are intended to provide for the contingency of discovering archaeological resources during project ground disturbance and include having an archaeologist and a Native American monitor all foundation, footing, and trench excavations in excess of four feet below the present surface. Staff's proposed mitigation measures for identifying, evaluating, and possibly mitigating impacts to previously unknown archaeological resources discovered during construction-related ground disturbance ensure that impacts to CRHR-eligible archaeological discoveries would be mitigated to a less-than-significant level.

Indirect Impacts on Cultural Resources

Neither the applicant nor staff identified any indirect impacts to any identified cultural resources in the impact area of the proposed project, and so no mitigation measures for indirect impacts would be required for any class of cultural resources.

Operation Impacts and Mitigation

During operation of the proposed power plant, if a leak should develop in any buried project components, repair of the buried utility could require the excavation of a large hole. Such repairs could impact previously unknown subsurface archaeological resources in areas unaffected by the original excavation. The measures proposed for mitigating impacts to previously unknown archaeological resources during the construction of the plant and linear facilities (proposed Conditions of Certification **CUL-1** through **CUL-7**) would also serve to mitigate impacts from repairs occurring during operation of the plant.

Cumulative Impacts and Mitigation

A cumulative impact refers to a proposed project's incremental effects considered over time and together with those of other, nearby, past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Pub. Resources Code sec. 21083; Cal. Code Regs., tit. 14, secs. 15064(h), 15065(c), 15130, and 15355). Cumulative impacts to cultural resources in the CESF project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed CESF, had or would have impacts on cultural resources that, considered together, would be significant. The previous ground disturbance from prior projects and the ground disturbance related to the future construction of the CESF and other proposed solar power projects in the vicinity could have a cumulatively considerable effect on subsurface archaeological deposits, both

prehistoric and historic. The alteration of the northern Carrizo Plain setting which could be caused by the construction and operation of the proposed CESF and other proposed solar power projects in the vicinity could be cumulatively considerable, but may not be a significant impact to cultural resources.

One prior project that caused large-scale ground disturbance, the ARCO Solar Project, was located on the land parcel adjacent (due east) to that proposed for the CESF. Constructed in 1983 and operated until the early 1990s, the facility's equipment was removed in the late 1990s, and, except for the tall chain-link fence surrounding it, the parcel now is undistinguishable from the surrounding fallow agricultural fields. Of the two 1983 cultural resources surveys completed for the ARCO Solar Project, one found no cultural resources (Sawyer 1983, sec. C), while the other found two isolated artifacts—a chert flake and an obsidian biface fragment, which were not recommended as significant cultural resources (Serena 1983, pp. 3-4, 6). No information is available on whether or not any additional archaeological materials were discovered during project construction.

In addition to the CESF, two other future, large-scale, solar power-generating projects are planned for the northern Carrizo Plain. Staff has not had access to cultural resources survey reports for these projects, so the only specific resources known to staff that could be affected by these projects are the farmsteads identified and evaluated as part of the analysis of the NCPCLHD. Again, none of those resources was evaluated as individually eligible for the CRHR, so no project's impacts to them, individually or cumulatively, would be significant and require mitigation.

On July 18, 2008, the Optisolar Company applied to San Luis Obispo County for a Conditional Use Permit to construct a large power-generating photovoltaic array, the Topaz Solar Farm (TSF). This project is proposed for 9.5 sections of land, bordering the CESF parcel to the north and west and taking up much of the leveled farm land of the northern Carrizo Plain to the northwest of CESF. This project would anchor its arrays on at-grade concrete ballasts, rather than attaching them to foundations poured into excavated holes, so it could result in less ground disturbance than the CESF project (Optisolar 2008a, p. 4).

SunPower has not yet made an application to San Luis Obispo County for its photovoltaic-array power-generating facility, so no information is available on the impacts that could result from this project, but a maximum desired survey area has been identified six miles east of the CESF project site (Hacker 2008). SunPower's maximum survey area covers about 17.5 sections of land, straddling Highway 58 and taking in the northeastern part of California Valley's platted grid, so its potential for ground disturbance and impact to cultural resources is considerably greater than that of the proposed CESF and TSF, as a function of sheer size.

In its cumulative impact analysis for the CESF project in the AFC (CESF2007a) and in the July, 2008, AFC Supplement (CESF2008h), Ausra identified 44 planned residential projects under consideration by San Luis Obispo County. Only nine involved new construction. The rest were additions and remodels to existing homes or the setting up of a manufactured home. Ausra then and now considered the cumulative impact of these small-scale residential projects, in combination with the CESF project, to be

minor. Ausra therefore concluded that the CESF and the other identified projects in the vicinity were not expected to result in significant cumulative impacts to cultural resources (CESF2007a, p. 5.7-28).

The Optisolar TSF application, however, created for Ausra the need for a more intensive analysis of cumulative CESF impacts, with TSF impacts considered, and a consideration of Ausra's fair share of any mitigation required for these impacts (CESF2008l, Data Response 112, Attachment A, p. A-1). From its revised analysis, however, Ausra again concluded that the CESF would have no foreseeable cumulative impacts on cultural resources (CESF2008l, Data Response 112, Attachment A, p. A-16). This conclusion was based on Ausra's cultural resources consultants having identified no CRHR-eligible cultural resources during the course of preparing their AFC or during the course of the Energy Commission's review of their application.

Staff, however, has identified known CRHR-eligible cultural resources on which the CESF project would have significant impacts, but staff has also proposed conditions of certification that would mitigate these impacts to below the level of significance. Staff has also proposed conditions of certification for the CESF project providing for identification, evaluation, and avoidance or mitigation of impacts to previously unknown CRHR-eligible archaeological resources discovered during the construction of the project.

Proponents of the TSF and SunPower projects, and of any other future projects in the northern Carrizo Plain area, could mitigate impacts to as-yet-undiscovered subsurface archaeological sites to less-than-significant levels by requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated as CRHR-eligible. Impacts to human remains can be mitigated by following the protocols established by state law in Public Resources Code, section 5097.98. Since the impacts from the proposed CESF project would be mitigated to a less-than-significant level by the project's compliance with proposed Conditions of Certification **CUL-1** through **CUL-10**, and since similar protocols can be applied to other projects in the area, staff does not expect any incremental effects on cultural resources of the proposed CESF project to be cumulatively considerable when viewed in conjunction with other projects.

COMPLIANCE WITH LORS

If the proposed conditions of certification are properly implemented, the proposed CESF project would result in a less-than-significant impact on known and newly found cultural resources. The project would therefore be in compliance with all applicable state laws, ordinances, regulations, and standards listed in Cultural Resources Table 1.

A County of San Luis Obispo Land Use ordinance has general language promoting the county-wide preservation of cultural resources. Staff's proposed conditions of certification require specific actions not just to promote but to effect historic preservation and mitigate impacts to all cultural resources in order to ensure CEQA compliance. Consequently, if these conditions are implemented, the CESF project's actions would be consistent with the general historic preservation goals of San Luis Obispo County.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has received no public comments regarding cultural resources and the proposed CESF project up to this time.

CONCLUSIONS AND RECOMMENDATIONS

Staff's cultural resources analysis has determined that the Carrizo Energy Solar Farm (CESF) project, proposed by Ausra CA II, LLC (Ausra) would have no impact on any known prehistoric archaeological sites, or on any known ethnographic resources, or on any individual built-environment resource, or on the Northern Carrizo Plain Cultural Landscape Historic District, with the adoption and implementation of Conditions of Certification **CUL-1** through **CUL-7**.

Staff, however, has identified a significant CESF project impact to two known, potentially California Register of Historical Resources (CRHR)-eligible, historic-period archaeological sites located on the project site parcel and the project laydown parcel, and subject to destruction to accommodate the project's use of the two parcels. The historic-period archaeological components at the King and Cavanaugh I farmsteads are the material remains of two examples of a unique lifestyle in California: early-to-mid-twentieth-century dryland farming and cattle ranching in a transportation-challenged area. Occupied from 1928 until circa1995, and from 1942 until circa 1995, the archaeological components at these farmsteads contain data that could be used to address research questions regarding the changing integration of Carrizo residents in the regional economy, as both producers and consumers during the mid-twentieth century, and regarding the unique adaptation of Carrizo residents to their arid and isolated environment. Staff has proposed a condition, **CUL-8**, requiring Ausra to carry out post-certification, pre-construction archaeological testing on these two sites, and additionally requiring data recovery as mitigation for their destruction by the project, if either or both prove to be CRHR eligible.

When properly implemented and enforced, staff believes that **CUL-1** through **CUL-8** would reduce to less than significant any impacts to both previously known and as-yet-to-be-identified CRHR-eligible cultural resources encountered during construction-related ground disturbance or operation. Additionally, with the adoption and implementation of these conditions, the proposed CESF project would be in conformity with all applicable LORS.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of ground disturbance (includes "preconstruction site mobilization"; "construction ground disturbance"; and "construction grading, boring, and trenching," as defined in the General Conditions for this project), the project owner shall obtain the services of a Cultural Resources Specialist (CRS), and one or more alternate CRSs, if alternates are needed. The CRS shall manage all monitoring, mitigation, curation, and reporting activities required in accordance with the Conditions of Certification (Conditions). The CRS may elect to obtain the services of Cultural Resources Monitors (CRMs)

and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility for listing in the California Register of Historical Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner. No ground disturbance shall occur prior to CPM approval of the CRS and alternates, unless such activities are specifically approved by the CPM. Approval of a CRS may be denied or revoked for non-compliance on this or other projects.

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the CPM that their training and backgrounds conform to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 C.F.R., part 61). In addition, the CRS shall have the following qualifications:

1. The CRS's qualifications shall include a background in historical archaeology;

2. At least three years of historical archaeological resource mitigation and field experience in California; and

3. At least one year of experience in a decision-making capacity on cultural resources projects in California and the appropriate training and experience to knowledgably make recommendations regarding the significance of cultural resources.

The resumes of the CRS and alternate CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS/alternate CRS on referenced projects and demonstrate to the satisfaction of the CPM that the CRS/alternate CRS has the appropriate training and experience to implement effectively the Conditions.

CULTURAL RESOURCES MONITORS

CRMs shall have the following qualifications:

1. a B.S. or B.A. degree in anthropology, archaeology, historical archaeology or a related field and one year experience monitoring in California; or

2. an AS or AA degree in anthropology, archaeology, historical archaeology or a related field, and four years experience monitoring in California; or

3. enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialist(s), e.g., prehistoric archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval.

Verification:

1. At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume for the CRS, and alternate(s) if desired, to the CPM for review and approval.

2. At least 10 days prior to a termination or release of the CRS, or within 10 days after the resignation of a CRS, the project owner shall submit the resume of the proposed new CRS to the CPM for review and approval. At the same time, the project owner shall also provide to the proposed new CRS the AFC and all cultural resources documents, field notes, photographs, and other cultural resources materials generated by the project. If there is no alternate CRS in place to conduct the duties of the CRS, a previously approved monitor may serve in place of a CRS so that project-related ground disturbance may continue up to a maximum of 3 days without a CRS. If cultural resources are discovered then ground disturbance will remain halted until there is a CRS or alternate CRS to make a recommendation regarding significance.

3. At least 20 days prior to ground disturbance, the CRS shall provide a letter naming anticipated CRMs for the project and stating that the identified CRMs meet the minimum qualifications for cultural resources monitoring required by this Condition. If additional CRMs are obtained during the project, the CRS shall provide additional letters to the CPM identifying the CRMs and attesting to the qualifications of the CRMs, at least 5 days prior to the CRMs beginning on-site duties.

4. At least 10 days prior to any technical specialists beginning tasks, the resume(s) of the specialists shall be provided to the CPM for review and approval.

5. At least 10 days prior to the start of ground disturbance, the project owner shall confirm in writing to the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources conditions.

CUL-2 Prior to the start of ground disturbance, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC, data responses, and confidential cultural resources reports for the project. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprints of the power plant, all linear facilities, all access roads, and all laydown areas. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:2000 or 1” = 200’) for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review map submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless such activities are specifically approved by the CPM.

If construction of the project would proceed in phases, maps and drawings not previously provided shall be submitted prior to the start of each phase.

Written notification identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

At a minimum, the CRS shall consult weekly with the project construction manager to confirm area(s) to be worked during the next week, until ground disturbance is completed.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

Verification:

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, and confidential cultural resources documents to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.

2. If there are changes to any project-related footprint, revised maps and drawings shall be provided at least 15 days prior to start of ground disturbance for those changes.

3. If project construction is phased, if not previously provided, the project owner shall submit the subject maps and drawings 15 days prior to each phase.

4. On a weekly basis during ground disturbance, a current schedule of anticipated project activity shall be provided to the CRS and CPM by letter, e-mail, or fax.

5. Within 5 days of identifying changes, the project owner shall provide written notice of any changes to scheduling of construction phase.

CUL-3 Prior to the start of ground disturbance, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by or under the direction of the CRS, to the CPM for review and approval. The CRMMP shall follow the content and organization of the model CRMMP, provided by the CPM, and the author's name shall appear on the title page of the CRMMP. The CRMMP shall identify general and specific measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each CRM, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless such activities are specifically approved by the CPM.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. The following statement included in the Introduction: "Any discussion, summary, or paraphrasing of the Conditions of Certification in this

CRMMP is intended as general guidance and as an aid to the user in understanding the conditions and their implementation. The conditions, as written in the Commission Decision, shall supersede any summarization, description, or interpretation of the conditions in the CRMMP. The Cultural Resources Conditions of Certification from the Commission Decision are contained in Appendix A."

2. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design shall specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. A mitigation plan shall be prepared for any CRHR-eligible resource (as determined by the CPM), impacts to which cannot be avoided. A prescriptive treatment plan may be included in the CRMMP for limited data types.

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground disturbance and post-ground–disturbance analysis phases of the project.

4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.

5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.

6. A description of all impact-avoidance measures (such as flagging or fencing) to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during project-related ground disturbance, construction, and/or operation, and identification of areas where these measures are to be implemented. The description shall address how these measures would be implemented prior to the start of ground disturbance and how long they would be needed to protect the resources from project-related effects.

7. A statement that all cultural resources encountered shall be recorded on Department of Parks and Recreation (DPR) 523 forms and mapped and photographed. In addition, all archaeological materials retained as a result of the archaeological investigations (survey, testing, data recovery) shall be curated in accordance with the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural

resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement that the CRS has access to equipment and supplies necessary for site mapping, photography, and recovery of any cultural resource materials that are encountered during ground disturbance and that cannot be treated prescriptively.

10. A description of the contents and format of the final Cultural Resource Report (CRR), which shall be prepared according to ARMR guidelines.

Verification:

1. Upon approval of the CRS proposed by the project owner, the CPM will provide to the CRS an electronic copy of the model CRMMP.

2. At least 30 days prior to the start of ground disturbance, the project owner shall submit the subject CRMMP to the CPM for review and approval.

3. At least 30 days prior to the start of ground disturbance, a letter shall be provided to the CPM indicating that the project owner agrees to pay curation fees for any materials collected as a result of the archaeological investigations (survey, testing, data recovery).

CUL-4 The project owner shall submit the final Cultural Resources Report (CRR) to the CPM for approval. The final CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The final CRR shall report on all field activities including dates, times and locations, findings, samplings, and analyses. All survey reports, DPR 523 forms, and additional research reports not previously submitted to the California Historical Resource Information System (CHRIS) and the State Historic Preservation Officer (SHPO) shall be included as an appendix to the final CRR.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources activities associated with the project shall be prepared by the CRS and submitted to the CPM for review and approval on the same day as the suspension/extension request. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the CPM for review and approval at the same time as the withdrawal request.

Verification:

1. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the final CRR to the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.

2. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall provide to the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, to accept cultural materials, if any, from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.

3. Within 10 days after CPM approval, the project owner shall provide documentation to the CPM confirming that copies of the final CRR have been provided to the SHPO, the CHRIS, the curating institution, if archaeological materials were collected, and to any Native American groups requesting copies of project-related reports.

4. Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the CPM for review and approval.

CUL-5 Prior to and for the duration of ground disturbance, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site, laydown area, and along the linear facilities routes. The training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance is completed or suspended, but must be resumed when ground disturbance, such as landscaping, resumes. The training shall include:

1. A discussion of applicable laws and penalties under the law;

2. Samples or visuals of artifacts that might be found in the project vicinity;

3. A discussion of what such artifacts may look like when partially buried, or wholly buried and then freshly exposed;

4. A discussion of what prehistoric and historical archaeological deposits look like at the surface and when exposed during construction, and the range of variation in the appearance of such deposits;

5. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt project-related ground disturbance in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;

6. Instruction that employees are to halt work on their own in the vicinity of a potential cultural resources discovery and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;

7. An informational brochure that identifies reporting procedures in the event of a discovery;

8. An acknowledgement form signed by each worker indicating that they have received the training; and

9. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the CPM.

Verification:

1. At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the training program draft text and graphics and the informational brochure to the CPM for review and approval, and the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

2. On a monthly basis, until ground disturbance is completed, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of workers at the project site and on the linear facilities who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 The project owner shall ensure that the CRS, alternate CRS, or CRMs monitor full time all ground disturbance in which excavation depths exceed three feet at the project site and interconnection transmission line route, and ground disturbance at the laydown area, roads, bridges, and other ancillary areas, to ensure there are no impacts to undiscovered resources and to ensure that known resources are not impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of all ground-disturbing activities on the project site, at the laydown area, along the interconnection transmission line route, and at roads, bridges, or other ancillary areas for as long as the activities are ongoing. Full-time archaeological monitoring shall require at least one monitor per excavation area where machines are actively disturbing native soils. If an excavation area is too large for one monitor to effectively observe the ground disturbance, one or more additional monitors shall be retained to observe the area.

In the event that the CRS believes that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the CPM for review and approval prior to any change in the level of monitoring.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered.

On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resources activities and any instances of non-compliance with the Conditions and/or applicable LORS. Copies of the daily monitoring logs shall be provided by the CRS to the CPM, if requested by the CPM. From these logs, the CRS shall compile a monthly monitoring summary report to be included in the MCR. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended. The CRS or alternate CRS shall report daily to the CPM on the status of cultural resources-related activities at the project site, unless reducing or ending daily reporting is requested by the CRS and approved by the CPM.

The CRS, at his or her discretion, or at the request of the CPM, may informally discuss cultural resources monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these Conditions.

Upon becoming aware of any incidents of non-compliance with the Conditions and/or applicable LORS, the CRS and/or the project owner shall notify the CPM by telephone or e-mail within 24 hours. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the Conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the CPM.

A Native American monitor shall be obtained to monitor ground disturbance along with the CRS, the alternate CRS, or the CRMs. Contact lists of interested Native Americans and guidelines for monitoring shall be obtained from the Native American Heritage Commission. Preference in selecting a monitor shall be given to Native Americans with traditional ties to the area that shall be monitored. If efforts to obtain the services of a qualified Native American monitor are unsuccessful, the project owner shall immediately inform the CPM. The CPM will either identify potential monitors or will allow ground disturbance to proceed without a Native American monitor.

Verification: **Verification:**

1. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of a form to be used as a daily monitoring log. While monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS.

2. Daily, as long as no cultural resources are found, the CRS shall provide a statement that “no cultural resources over 50 years of age were discovered” to the CPM as an

e-mail, or in some other form acceptable to the CPM. If the CRS concludes that daily reporting is no longer necessary, a letter or e-mail providing a detailed justification for the decision to reduce or end daily reporting shall be provided to the CPM for review and approval at least 24 hours prior to reducing or ending daily reporting.

3. At least 24 hours prior to implementing a proposed change in monitoring level, documentation justifying the change shall be submitted to the CPM for review and approval.

4. No later than 30 days following the discovery of any Native American cultural materials, the project owner shall submit to the CPM copies of the information transmittal letters sent to the Chairperson of the Native American tribes or groups who requested the information. Additionally, the project owner shall submit to the CPM copies of letters of transmittal for all subsequent responses to Native American requests for notification, consultation, and reports and records, and any comments or information provided in response by the Native Americans.

CUL-7 The project owner shall grant authority to halt project-related ground disturbance to the CRS, alternate CRS, and the CRMs in the event of a discovery. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor in consultation with the CRS.

In the event cultural resources over 50 years of age or, if younger, determined exceptionally significant by the CPM, are found, or impacts to such resources can be anticipated, ground disturbance shall be halted or redirected in the immediate vicinity of the discovery sufficient to ensure that the resource is protected from further impacts. Monitoring and daily reporting as provided in **CUL-6** shall continue during all ground-disturbing activities elsewhere on the project site. The halting or redirection of ground disturbance shall remain in effect until the CRS has visited the discovery, and all of the following have occurred:

1. The CRS has notified the project owner, and the CPM has been notified within 24 hours of the discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning, including a description of the discovery (or changes in character or attributes), informed of the action taken (i.e., work stoppage or redirection), provided a recommendation of CRHR eligibility, and provided recommendations for mitigation of any cultural resources discoveries, whether or not a determination of CRHR eligibility has been made.

2. If the discovery is prehistoric or ethnographic, the CRS has notified all Native American groups that expressed a desire to be notified in the event of such a discovery.

3. The CRS has completed field notes, measurements, and photography for a DPR 523 “Primary” form. The “Description” entry of the DPR 523 “Primary” form shall include a recommendation on the CRHR eligibility of

the discovery. The project owner shall submit completed forms to the CPM.

4. The CRS, the project owner, and the CPM have conferred, and the CPM has concurred with the recommended eligibility of the discovery and approved the CRS's proposed data recovery, if any, including the curation of the artifacts, or other appropriate mitigation; and any necessary data recovery and mitigation have been completed.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the CPM and CRS with a letter confirming that the CRS, alternate CRS, and CRMs have the authority to halt project-related ground disturbance in the vicinity of a cultural resources discovery, and that the project owner shall ensure that the CRS notifies the CPM within 24 hours of a discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.
2. Within 48 hours of the discovery of an archaeological or ethnographic resource, the project owner shall ensure that the CRS notifies all Native American groups that expressed a desire to be notified in the event of such a discovery.
3. Unless the discovery can be treated prescriptively, as specified in the CRMMP, completed DPR 523 forms for resources newly discovered during ground disturbance shall be submitted to the CPM for review and approval no later than 24 hours following the notification of the CPM, or 48 hours following the completion of data recordation/recovery, whichever the CRS decides is more appropriate for the subject cultural resource.

CUL-8 Prior to site mobilization or construction-related ground disturbance within 100 feet around, and inclusive of, the King farmstead, and prior to site mobilization or construction-related ground disturbance within 100 feet around, and inclusive of, the Cavanaugh I farmstead, the project owner shall submit for CPM approval a Cultural Resources Testing and Data Recovery Plan (CRTDRP), completed by or under the direction of the CRS. The submitted CRTDRP shall include the proposed personnel, methods, and research framework for presence/absence testing for subsurface archaeological deposits and data recovery activities applicable to the two farmstead historic-period archaeological sites, and shall also provide a plan for, if needed, data recovery in the event that CRHR-eligible deposits are identified as a result of testing, including a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research framework. The project owner shall ensure that all tasks under the CRTDRP are undertaken by or under the direction of the CRS, who shall employ persons for these tasks having the minimum qualifications of a CRM.

To prepare the two sites for archaeological testing and data-gathering, the CRS shall systematically photograph the two sites as found to record the distribution of structures and materials across the sites for later comparison to archaeological discoveries, then the project owner shall remove all above-

ground structures, equipment, materials, and debris from the two sites, but leave in place the structure foundations and trash piles and scatters.

If as a result of the presence/absence testing, data recovery is also required by the CPM, the project owner shall ensure that the CRS completes data recovery, per CPM-approved CRTDRP, and shall submit, for CPM approval, the CRS's final technical report, in ARMR format, on all activities carried out under the CRTDRP, including personnel, methods, and results, with updated DPR 523 site forms for the two farmstead sites included in an appendix.

No ground disturbance shall occur within 100 feet around, and inclusive of, the King farmstead, and within 100 feet around, and inclusive of, the Cavanaugh I farmstead, prior to completion of tasks identified in the CRTDRP or additionally required by the CPM, and prior to CPM approval of the submitted final technical report on all activities carried out under the CRTDRP, unless specifically approved by the CPM.

Verification:

1. At least 120 days prior to the start of construction-related ground disturbance within 100 feet around, and inclusive of, the King farmstead, and within 100 feet around, and inclusive of, the Cavanaugh I farmstead, the project owner shall submit the CRTDRP for CPM approval.

2. At least 60 days prior to ground disturbance within 100 feet around, and inclusive of, the King farmstead, and within 100 feet around, and inclusive of, the Cavanaugh I farmstead, the project owner shall submit for CPM approval a final technical report (in ARMR format) that provides personnel, methods, results, and updated DPR 523 forms for all archaeological activities completed pursuant to the CRTP.

CULTURAL RESOURCES ACRONYM GLOSSARY

CARRIZO ENERGY SOLAR FARM

AFC	Application for Certification
Ausra	Ausra CA II, LLC, the project applicant
ARMR	Archaeological Resource Management Report
CEQA	California Environmental Quality Act
CESF	Carrizo Energy Solar Farm
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resources inventory form
FSA	Final Staff Assessment
LORS	laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report
MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
PSA	Preliminary Staff Assessment

SHPO	State Historic Preservation Officer
Staff	Energy Commission cultural resources technical staff
TSF	Topaz Solar Farm, a proposed large-scale photovoltaic power facility
WEAP	Worker Environmental Awareness Program

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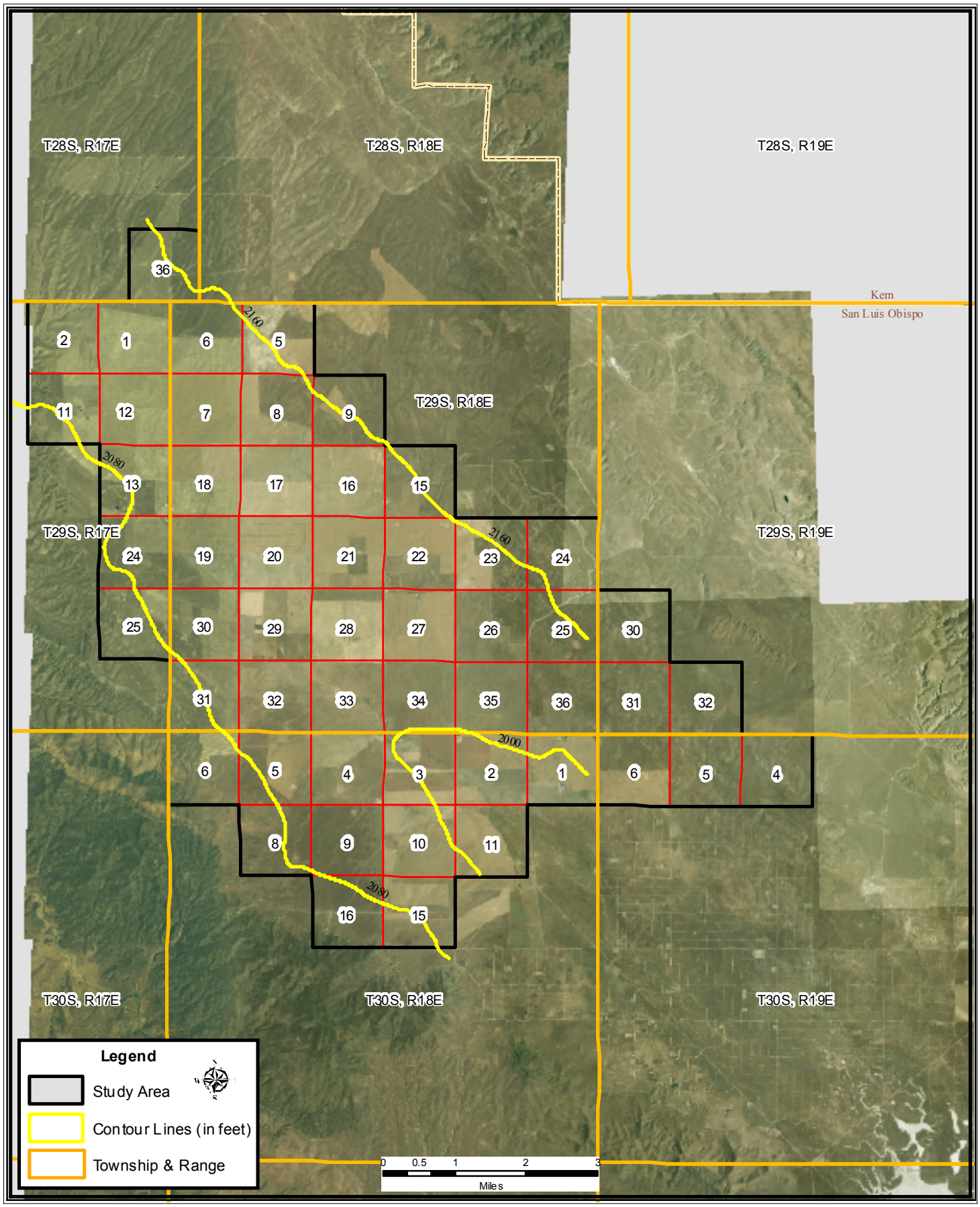
CULTURAL RESOURCES - FIGURE 1

Carrizo Energy Solar Farm - Northern Carrizo Plain Cultural Landscape Study Area



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: California Energy Commission - 2005 NAIP Imagery

HAZARDOUS MATERIALS MANAGEMENT

Geoff Lesh, P.E., and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff's evaluation of the proposed Carrizo Energy Solar Farm (CESF), along with staff's proposed mitigation measures, indicates that 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. In response to Health and Safety Code, section 25531 et seq., the applicant would be required to develop a Risk Management Plan. Other proposed conditions of certification address the issue of hazardous materials storage.

INTRODUCTION

The purpose of this hazardous materials management analysis is to determine if the proposed Carrizo Energy Solar Farm (CESF) project 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.

Hazardous materials, such as mineral and lubricating oils, cleaning detergents, and welding gasses will be present at the proposed CESF project. Hazardous materials used during construction would include gasoline, diesel fuel, motor oil, hydraulic fluid, welding gases, lubricants, solvents, paint, and paint thinner. No acutely toxic hazardous materials will be used on site during construction. 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. Handling of hazardous materials during construction would comply with all applicable regulations and would be guided by a Hazardous Materials Business Plan (HMBP) developed by the CESF prior to the start of construction (CESF2007a, Sections 5.15.2.1 and 5.15.5.5).

No natural gas is used or stored by the proposed CESF project. There is no proposed offsite natural gas supply line. This document addresses all potential impacts associated with the use and handling of 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 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
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.
Local	
San Luis Obispo County Department of Environmental Health Services	Requires new/modified businesses to complete a Hazardous Materials Business Plan (HMBP) and Chemical Inventory Forms prior to final plan/permit approval. Regulates enforcement responsibility for the implementation of Title 23, Division 3, Chapter 16 and 18 of CCR, as it relates to hazardous material storage and petroleum underground storage tank cleanup.

The Certified Unified Program Agency (CUPA) with the responsibility to review HMBPs is the San Luis Obispo County Department of Environmental Health Services (DEHS) (CESF2007a, Section 5.15.5.3). With regard to seismic safety issues, the site is located in Seismic Risk Zone 4. Construction and design of buildings and vessels storing hazardous materials will meet the seismic requirements of the 2007 California Building Code and the San Luis Obispo County Building Code (CESF2007a, Section 3.5.1.1).

SETTING

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 directions are described in the **Air Quality** section (5.2) and **Appendix I-D** of the Application for Certification (AFC) (CESF2007a).

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 Project site currently consists primarily of disturbed ranchland. The Project location is within a valley between the Temblor and Caliente mountain ranges, near Carrizo Plain National Monument, and 10 miles northwest of Soda Lake. The Carrizo Plain is an approximately 45 mile long by 15 mile wide native grassland of California, and follows the San Andreas Fault. Land use within 10 miles of the Project consists of wild grasslands and agricultural and is considered rural (CESF2007a, Section 5.16.1). The site is generally flat and slopes gently to the southwest with elevations ranging from approximately 629 m (2064 feet) to 614 m (2014 feet) above mean sea level. (CESF2007a, Section 3.3.1).

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 and residences within three miles of the project are shown in Figure 5.16-1 of the AFC (CESF2007a). Only two sensitive receptors were identified within 3 miles of the Project, the closest is the Carrisa Plains School located approximately 1,400 feet southeast of the Project and the Carrisa Plains Community Farm Center located approximately 2.7 miles southeast of the Project. The nearest resident is located approximately 400 feet northeast of the northeastern corner of the property line. The nearby residents are shown in Figure 5.16-1. (CESF2007a, Section 5.16.1).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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 (CESF2007a, Section 5.15). 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 5.15-2** of the AFC (CESF2007a) 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 any 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.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Small Quantity Hazardous Materials

Hazardous chemicals such as mineral and lubricating oils, cleaning detergents, welding gasses, and other various chemicals would be used and stored in relatively small amounts. (See **Hazardous Materials Appendix A** for a list of all chemicals proposed for use and storage at CESF). In conducting the analysis, staff determined in Steps 1

and 2 that these materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they will be stored in small quantities, have low mobility/volatility, or have low levels of toxicity. These hazardous materials were eliminated from further consideration.

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, there were no remaining hazardous materials for staff to consider and review through Steps 3, 4, and 5 that might pose a significant risk to offsite members of the public. The project will be limited to using, storing, and transporting only those hazardous materials listed in Appendix A of this document as per staff's proposed condition **HAZ-1**.

Large Quantity Hazardous Materials

There are no large quantity hazardous materials proposed for use or storage at CESF during either the construction or operations phases of the project that would pose a significant offsite risk.

Mitigation

The potential for accidents resulting in the release of hazardous materials is greatly reduced through implementation of a safety management program that would include the use of both engineering and administrative controls. Elements of both 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 CESF project include:

- storage of containerized hazardous materials in their original containers which are designed to prevent releases and are appropriately labeled;
- construction of secondary containment areas surrounding each of the hazardous materials storage areas designed to contain accidental releases that might happen during storage or delivery;
- 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;
- process protective systems including continuous tank level monitors with automatic alarms that are triggered at set high and low level points, automated leak detectors, temperature and pressure monitors, alarms, and emergency block valves.

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.

A Hazardous Materials Business Plan (HMBP) will be prepared by the applicant that would incorporate state requirements for the handling of hazardous materials (CESF2007a, Section 5.15.2.1). Other administrative controls would be required in proposed Condition of Certification **HAZ-1** (limitations on the use and storage of hazardous materials and their strength and volume).

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.

Proposed Condition of Certification **HAZ-2** will require that CESF maintain and implement an HMBP. The CESF will implement Best Management Practices (BMP) consistent with the hazardous materials handling, emergency spill response, and reporting as specified in the HMBP. If there is a spill or release of hazardous materials during operations, the spill area will be bermed or controlled as quickly as practical to minimize the footprint of the spill. Contaminated soil materials produced during cleanup of a spill will be placed into drums for offsite disposal as a hazardous waste at a permitted hazardous waste facility. If a spill or leak into the environment involves hazardous materials equal to or greater than the specific reportable quantity, federal, state, and local reporting requirements will be adhered to. In particular, the San Luis Obispo County DEHS will be notified. The California Department of Forestry and Fire Protection/San Luis Obispo County Fire Department (CDF/SLOCFD) will also be called in the event of a fire or injury. In addition, the CESF is designed with one oil/water separator (OWS). All drains from transformers, turbine skid, and other mechanical

equipment and potential oily “contact” areas will be routed to the OWS, which separates out any oil before the effluent is recovered in the water treatment system. The oil contaminated fluid will be pumped out by a vacuum truck on an as-needed basis and disposed of at a facility specifically qualified to handle such waste.

The CESF does not plan on storing or using natural gas or other gases as part of the proposed Project; therefore, there will be no significant fire or explosion risk associated with the proposed Project (CESF2007a, Section 5.15.2.2).

The CDF/SLOCFD would be the first responder for hazardous materials incidents. Staff finds that the available local hazmat teams are capable of responding to a hazardous materials emergency call from CESF with an adequate response time.

Transportation of Hazardous Materials

Any hazardous materials will be transported to the facility by truck. Motor fuels (gasoline and diesel), will be the major hazardous materials to be transported to the site. 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. See AFC section 5.11 for additional information on regulations governing the transport of hazardous materials.

Based on the environmental mobility, toxicity, the quantities at the site, and frequency of delivery, it is staff’s opinion that the transportation of hazardous materials to the proposed project does not pose a significant risk.

Seismic Issues

It is possible that an earthquake could cause the failure of a hazardous materials storage tank. 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 a vapor cloud of hazardous materials that could move off site and affect residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, have all heightened concerns about earthquake safety.

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. Therefore, staff 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 also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks failed as a result of that earthquake. Referring to the sections

on **Geologic Hazards and Resources** and **Facility Safety Design** in the AFC, staff notes that the proposed facility will be designed and constructed to the standards of the 2007 California Building Code for Seismic Zone 4 (CESF2007a, Section 3.5.1.1). 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. Additionally, based on the environmental mobility, toxicity, the quantities at the site, it is staff's opinion that the storage of hazardous materials at the proposed project does not pose a significant risk.

Site Security

The applicant proposes to use hazardous materials identified by the U.S. EPA as requiring the development and implementation of special site security measures to prevent unauthorized access. The U.S. EPA published a Chemical Accident Prevention Alert regarding site security (EPA 2000a), the U.S. Department of Justice published a special report entitled *Chemical Facility Vulnerability Assessment Methodology* (US DOJ 2002), the North American Electric Reliability Council published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy (DOE) published the 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 that facilities that use or store certain hazardous materials conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A of that rule, the list of chemicals, on November 2, 2007. Staff still 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.

The AFC contains descriptions of the proposed security implementation for both the construction site and the operating facility. The construction site and laydown areas will be fenced with a minimum 3 m (10-foot) high chain link fence, which will remain in place as the permanent site perimeter fence. Entrance to the site will be via a gated entrance from Tracy Lane at the northeastern corner of the facility. A second gated entrance at the southwest corner of the site will provide ingress and egress between the site and the construction laydown area south of SR-58. The construction laydown area will be fenced with a temporary 3-meter (10-foot) chain link fence with a gated entrance from SR-58 (CESF2007a, Section 3.4.13.1.1).

The operating facility also will be fenced with a minimum 3 meter (10-foot) chain link fence with three strands of barbwire on top and with privacy lattice around the perimeter. Entrance to the facility will be through one 7.3 m (24 feet) wide motorized gate equipped with a security monitoring system, including a camera and intercom system, remotely controlled from the control room. Separate access will be provided to the switchyard and metering substation building. Access to individual buildings will be controlled with proximity badge readers (CESF2007a, Section 3.4.10.7.5).

In order to ensure that neither this project nor a shipment of hazardous material is the target of unauthorized access, staff's proposed Conditions of Certification **HAZ-3** and

HAZ-4 address both construction security and operation security plans. These plans would require implementation of site security measures consistent with the above-referenced documents.

The goal of these conditions of certification is to provide for the minimum level of security for power plants necessary for the protection of California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for the CESF project 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 the 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 North American Electric Reliability Council's (NERC) 2002 guidelines, the U.S. DOE VAM-CF model, and the U.S. Department of Homeland Security regulations published November 2007 in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that this project would fall into the category of low vulnerability. Staff therefore 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, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contacts in the event of a security breach. Site access for vendors shall be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors will have to maintain their transport vehicle fleet and employ only properly licensed and trained drivers. 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. DOE, or the NERC, after consultation with both appropriate law enforcement agencies and the applicant.

CUMULATIVE IMPACTS AND MITIGATION

Staff analyzed the potential for the existence of cumulative impacts. 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 in the vicinity that use or store gaseous or liquid hazardous materials, or locations where such facilities might likely be built (Optisolar's Topaz Solar Farm and Sun Power's California Valley Solar Ranch) 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, in combination with the environmental mobility, toxicity, and quantities at the site. 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 CESF 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 the CESF 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.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff concludes that construction and operation of the CESF 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.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use will pose no significant impact to the public. Staff's analysis also shows that there will be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project will comply with all applicable LORS. Other proposed conditions of certification address the issue of the transportation and storage of hazardous materials in addition to site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented herein, to ensure that the project is designed, constructed, and operated to comply with all applicable LORS. If all mitigation proposed by the applicant and staff are required and implemented, the use, storage, and transportation of hazardous materials will not present a significant risk to the public.

Staff proposes four conditions of certification mentioned throughout the text (above), and listed below. Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in **Appendix A** of the staff assessment, unless there is prior approval by the Energy Commission compliance project manager. Condition of Certification **HAZ-2** ensures that local emergency personnel and first responders are informed of what materials and their quantities are stored on site. Site security during both the construction and operations phases is addressed in Conditions of Certification **HAZ-3** and **HAZ-4.**

PROPOSED CONDITIONS OF CERTIFICATION

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

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

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan to the California Department of Forestry and Fire Protection/San Luis Obispo County Fire Department (CDF/SLOCFD) and the CPM for review. Copies of the final HMBP shall then be provided to the CDF/SLOCFD for information and to the CPM for approval.

Verification: At least thirty (30) days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of the final HMBP to the CPM for approval.

HAZ-3 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-4 The project owner shall 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 8 feet high;
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;

6. A. a statement (refer to sample, **Attachment A**), signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to 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;

7. site access controls for employees, contractors, vendors, and visitors;

8. closed circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and

9. additional measures to ensure adequate perimeter security consisting of either:

   a. at least one security guard 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, and **all** of the following:

      1. the CCTV monitoring system required in item 9, above, shall include cameras able to pan, tilt, and zoom; that have low-light capability, are recordable, and are able to view 100 percent of the perimeter fence, the ammonia storage tank, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **and**

      2. perimeter breach detectors **<u>or</u>** on-site motion detectors.

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—

e.g.: transformers—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 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.

SAMPLE CERTIFICATION (Attachment A)

Affidavit of Compliance for Project Owners

I,

_____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____

(Company name)

for employment at

_____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

_____

(Signature of officer or agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment B)

Affidavit of Compliance for Contractors

I,

_____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____

(Company name)

for contract work at

_____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

_____

(Signature of officer or agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

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HAZARDOUS MATERIALS Appendix A
Hazardous Materials Proposed for Use and Storage On-site at the CESF

Chemical	Use	Storage Location	State	Storage Quantity
Diesel fuel	Firewater pump driver	Firewater skid	Liquid	300 gallons for initial fill. Maintain full diesel tank
Diesel fuel	Refueling station service vehicles	Power block refueling station	Liquid	1,000 gallons Maintain full diesel tank
Gasoline	Refueling station service vehicles	Power block refueling station	Liquid	1,000 gallons Maintain full gasoline tank
Cleaning chemicals/detergents	Periodic cleaning	Warehouse/Shop area	Liquid	132 gallons
CORTOL OS5300	Oxygen scavenger	Water treatment building	Liquid	925 gallons for initial fill
Lubricating oil	Lubricated rotating equipment (e.g., STG lube oil systems)	Contained in storage tanks on equipment	Liquid	3,170 gallons total
Laboratory reagents	Water laboratory analysis	Water treatment building	Liquid and granular solid	<1 gallon
Mineral transformer insulating oil	Generator step-up (GSU) transformers	Contained within transformers and electrical switches	Liquid	11,000 gallons each
Mineral transformer insulating oil	Standby transformer	Contained within transformers and electrical switches	Liquid	4,000 gallons
Mineral transformer insulating oil	Auxiliary transformers	Contained within transformers and electrical switches	Liquid	3,000 gallons each
Propylene glycol	Coolant antifreeze	Power block	Liquid	55 gallons

Source: AFC Table 5.15-2

LAND USE

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SUMMARY OF CONCLUSIONS

With the exception of chapter 22.32.030 of the San Luis Obispo County Land Use Ordinance, the proposed Carrizo Energy Solar Farm (CESF or "proposed project"), with implementation of the recommended conditions of certification, would be consistent with the applicable laws, ordinances, regulations, and standards (LORS), pertaining to local land use planning and would not generate a significant impact under the California Environmental Quality Act (CEQA) guidelines. Energy Commission staff is proposing Conditions of Certification **LAND-1** to ensure that the proposed project mitigates the permanent loss of 640 acres of agricultural lands; and **LAND-2** to ensure that the project is constructed and operated in accordance with the San Luis Obispo County's (county) minimum development standards for Electric Generating Plants in the Agriculture (AG) zone. Staff will continue to work with San Luis Obispo County to determine the project's compliance with chapter 22.32.030 of the San Luis Obispo County Land Use Ordinance.

INTRODUCTION

The land use analysis focuses on the project's consistency with land use plans, ordinances, regulations, and policies and the project's compatibility with existing or reasonably foreseeable land uses. In addition, a power plant 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.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Land use LORS directly applicable to the proposed project and the surrounding area include the County of San Luis Obispo General Plan, including the Shandon-Carrizo Area Plan, and the County of San Luis Obispo Land Use Ordinance. **LAND USE Table 1** provides a general description of land use LORS applicable to the proposed project and surrounding lands. The project's consistency with these LORS is discussed in **LAND USE Table 2**. The project site does not involve federally managed lands; therefore, there are no identified applicable federal land use related LORS.

LAND USE Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	None
State	
Subdivision Map Act (Public Resources Code Section 66410-66499.58)	This section of the California Public Resources Code provides procedures and requirements regulating land division (subdivisions) and parcel legality. Regulation and control of the design and improvement of subdivisions have been vested in the legislative bodies of local agencies.
Local	
San Luis Obispo County General Plan	The San Luis Obispo County General Plan, adopted in September 1980 and last revised in January 2007, reflects the values and contains the goals of the community with respect to development. The plan is general in nature and provides a vision of the future. The General Plan contains an evaluation of existing conditions and provides long-term goals and policies to guide growth and development for the next 15 to 25 years. The General Plan is implemented by the county through its zoning, subdivision ordinances, specific plans, growth management policies, planned development districts, development agreements, development review, code enforcement, land use database, capital improvement programs, environmental review procedures, building and housing codes, and redevelopment plans. The general plan elements applicable to the land use and agricultural resources associated with the proposed project are described below.
Framework for Planning (Inland) – The Land Use and Circulation Elements (SLOC 2007a)	The Framework for Planning is one of the sections/elements of the San Luis Obispo General Plan. The Land Use Element provides the framework for county decisions on land use and development, and represents the values and goals of the county regarding land use. The Land Use Element coordinates policies and programs in other county general plan elements that affect land use, and provides policies and standards for the management of growth and development in each unincorporated community and the rural areas of the county. The Land Use Element also serves as a reference point and guide for future land use planning studies throughout the county.
Shandon-Carrizo Area - The Land Use and Circulation Elements Plan (2003a)	This part of the Land Use Element allocates land use throughout the planning area by land use categories. The land use categories determine the varieties of land use that may be established on a parcel of land, as well as defining their allowable density and intensity. This section includes ordinances regulating utility supply; including water supply, sewage disposal, solid waste disposal, and drainage.
Energy Element - The Land Use and Circulation Elements	The purpose of this section of the Land Use Element is to increase energy efficiency in the county, provide policy guidance regarding the implications of energy use, document the county's energy resources,

Applicable LORS	Description
Plan (SLOC 1995)	determine land use and environmental criteria for evaluating future energy projects, and provide alternatives which encourage exceeding the state's energy regulations for new construction.
Agriculture and Open Space Element (SLOC 2007b)	The Agriculture and Open Space Element identifies the areas in the county with productive farms, ranches and soils, and open space lands that are worthy of protection for their intrinsic value. The element then establishes goals, policies and implementation measures that will enable long-term stability, productivity and protection.
Land Use Ordinance - Title 22 of the County Code (SLOC 2003b)	The Land Use Ordinance establishes regulations to protect and promote the public health, safety and welfare. This is achieved by implementing and ensuring compliance of the General Plan in order to guide and manage the future growth of the county; regulation of land use in a manner that will encourage and support the orderly development and beneficial use of lands within the county; minimizing adverse effects on the public resulting from the inappropriate creation, location, use or design of building sites, buildings, land uses, parking areas, or other forms of land development by providing appropriate standards for development; protecting and enhancing the significant natural, historic, archaeological and scenic resources within the county as identified by the County General Plan; and providing assistance to the public.

SETTING

PROPOSED PROJECT

Solar Energy Farm Site

The proposed 640-acre CESF site is located in an unincorporated area of eastern San Luis Obispo County, and consists of one Assessor Parcel Number (APN 072-091-001). The proposed project site is immediately north of California State Route 58/Carrisa Highway (SR-58) and west of the communities of Simmler and California Valley. The CESF site currently consists of disturbed ranchland and abandoned farm structures, which would be demolished prior to proposed project construction (CESF 2007a).

Construction Laydown Area

The proposed project also consists of a 380-acre construction laydown area located immediately to the south of the proposed CESF site. The construction laydown area is located on a single legal parcel of land (APN 072-091-010), and currently consists of an abandoned residence which would be demolished prior to the start of construction.

Other Project-Related Facilities

In addition to the proposed CESF site and construction laydown area, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown area), including:

- A 0.5-mile, 6-inch underground water pipeline, which would provide untreated groundwater to the proposed project site from an existing onsite well. This pipeline would be located within the proposed project site boundary;
- Seven miles of roadways (paved or gravel) internal to the proposed project site, which would be enclosed with a 10-foot chain-link fence;
- Approximately 850 feet of 230 kV transmission line within the Power Block consisting of two single circuits from the project switchyard to a new onsite Pacific Gas and Electric (PG&E) Switching Station as the point of interconnection. In addition, the project would include and PG&E would own and operate an additional 90 feet of off-site electric transmission line beyond the Switching Station located along the northern boundary of the proposed CESF. The 90-foot long transmission line segment would be primarily offsite, and would connect to a tower located within the existing PG&E Morro Bay-Midway 230 kV transmission line right-of-way, which runs east-west along the northern boundary of the proposed CESF site; and
- A 40,000 square foot manufacturing building would be temporarily constructed on the north-central portion of the construction laydown area, and would remain for the duration of construction. After construction, the building would be dismantled, and the site would be restored to its previous condition.

For a detailed description of the proposed project components and associated facilities, see the **Project Description** section of this document.

SURROUNDING AREA

The majority of land surrounding the proposed CESF site is used for agricultural/dry-farming activities (CESF 2007a). Other existing notable land uses in the area surrounding the proposed CESF site include (see AFC **Figure 5.9-2**):

- Scattered agricultural-related rural residences;
- The PG&E Carrizo Plain Substation, adjacent to the northeast corner of the CESF site;
- The PG&E transmission line corridor running in an east-west orientation along the northern boundary of the CESF site;
- Carrisa Plains School (K-8 school with a total enrollment of 31 students) located 0.8-mile southeast of the proposed CESF site, and less than 0.25-mile southeast of the construction laydown area;
- A 12-foot tall water storage tank located south of the construction laydown site; and
- The Carrisa Plains Community Farm Center located approximately 2.7 miles southeast of the project.

AGRICULTURAL LANDS

The proposed project site and surrounding area predominately include agricultural lands that are currently restricted to agricultural and open space uses. As shown in AFC **Figures 5.9-1 and 5.9-3**, there are 637,660 acres of agricultural land in the Shandon-Carrizo planning area with over 608,778 acres of parcels of farmland within the protection of the Williamson Act. The proposed project and its related facilities would not

be located on lands subject to Agricultural Land Conservation (i.e., Williamson Act) contracts (CESF 2007a).

In addition, the United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) provides information on designation of soils in areas with agricultural lands (NRCS 2008). The NRCS designates the proposed project and the surrounding area as agricultural lands/farmlands. Specifically, the NRCS classifies the project site as prime agricultural land if irrigated (NRCS 2008). The areas surrounding the CESF site, construction laydown area, and within 0.25 miles of the project-related linear facilities predominately consist of lands designated by the NRCS as prime farmland if irrigated (NRCS 2008).

The Farm Land Mapping and Monitoring Program (FMMP) of the California Department of Conservation (DOC) provides statistics on conversion of farmland to non-agricultural uses in San Luis Obispo County. However, according to the DOC, the Carrizo Plains area of the county has been surveyed, but not yet mapped for inclusion in the FMMP (CEC 2008ac). In addition, based on information provided by Energy Commission staff (staff), the DOC Mapping Unit reviewed the proposed project site using the USDA National Agriculture Imagery Program (NAIP) 2005 imagery (DOC 2008). According to the DOC, "…[u]nder the standard FMMP mapping criteria, the site would be considered Farmland of Local Importance. This is due to its land use (non-irrigated grain). Though the soil units qualify for Prime Farmland, the lack of irrigation precludes that designation" (DOC 2008).

According to the Shandon-Carrizo Area Plan, the proposed CESF site, construction laydown area, and associated facilities all lie within lands designated "Agriculture" by the San Luis Obispo County General Plan and Land Use Ordinance. In addition, according to the County of San Luis Obispo, Department of Agriculture, "…[t]he project site and area would be considered Important Farmland classified as Farmland of Local Importance through locally adopted ordinance under 7 CFR 657..5(d)" (SLOC 2008d).

GENERAL PLAN LAND USE AND ZONING DESIGNATIONS

Project Site

San Luis Obispo County's Shandon-Carrizo Area Plan designates land uses within the planning area by land use category (SLOC 2003a). The CESF site is located within the "Rural Area" portion of the Area Plan, because it is outside the county's urban and village reserve lines. The Rural Areas consist of the four land use categories which include: Open Space, Rural Lands, Agriculture, and Commercial Service. For each planning area, a land use program recommends specific non-mandatory actions or policies. The current San Luis Obispo County General Plan land use designation (i.e., Shandon-Carrizo Area Plan) for the proposed project site, construction laydown area, and surrounding lands is "Agriculture."

The San Luis Obispo County Land Use Ordinance categorizes the proposed CESF site and construction laydown area within the Agriculture, Resource and Open Space Land Use Category. These lands have a San Luis Obispo County zoning designation of "Agricultural (AG)" (CESF 2007a). Electrical generation is an allowable use (coded A2) that is subject to standards set forth by Article 4, Chapter 22.32 (Electric Generating

Plants), which requires a Minor Use Permit (MUP) and lists development standards regarding bonding, environmental quality assurance, clearing and vegetation, utility interconnection, and noted other requirements that may be imposed through conditions of approval for an MUP or Conditional Use Permit (SLOC 2003a).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff has analyzed the information provided in the AFC and has acquired information from other sources to determine consistency of the proposed CESF with applicable land use LORS and the proposed project's potential to have significant adverse land use-related impacts. In addition, conditions developed by staff to reduce any potential impacts to a less than significant level are provided, as well as a discussion of the feasibility and enforceability of the recommended conditions of approval.

METHOD AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff, as well as applicable LORS utilized by other governmental regulatory agencies. An impact may be considered significant if the proposed project results in:

- Conversion of Farmland[1]
  - 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.
- Physical disruption or division of an established community.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project. This includes, but is not limited to, a General Plan, redevelopment plan, or zoning ordinance.

[1] In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment (LESA) Model prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland (CCR 2006). The intent of the LESA Model is to provide: land use analysts with a quantitative means of determining agricultural land and Farmland disturbance acreages; and quantitative thresholds to determine the level of severity of those land disturbance impacts. The results of the LESA Model are then used to determine the occurrence of significant impacts on agricultural lands and Important Farmlands based on the CEQA Guidelines Appendix G thresholds of significance. Note that the California Energy Commission uses the LESA Model for assessment of impacts to agricultural lands for power generation facilities.

- 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.

In general, a solar farm and its related facilities may also be incompatible with existing or planned land uses, resulting in potentially significant impacts, if they create unmitigated noise, dust, or a public health or safety hazard or nuisance; result in adverse traffic or visual impacts; or preclude, interfere with, or unduly restricts existing or future uses. Please see other sections of this document, as noted, for a detailed discussion of any additional potential project-related impacts and recommended mitigation and conditions of certification.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Conversion of Farmland

As acknowledged in the AFC, the potential environmental consequences relating to land use arise mainly due to the "conversion of 640 acres in the agriculture zone of the Shandon-Carrizo Planning Area from agricultural use to solar energy capture and energy conversion apparatus, attendant outbuildings, supporting structures, roadways, and parking lots" (CESF 2007a, page 5.9-3). Because the applicant has agreed, upon completion of construction, to return the 380-acre laydown area to its pre-construction condition, use of the laydown area does not contribute to conversion of farmlands in the region.

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, following is a list of the various designations or categorizations these multiple governmental agencies have provided for the proposed project site and construction laydown area:

- **USDA NRCS:** According to the Web Soil Survey administered, the NRCS designates the proposed project and the surrounding area as agricultural lands/farmlands. Specifically, the NRCS classifies the project site as prime agricultural land if irrigated (NRCS 2008).
- **California DOC:** Under the standard FMMP mapping criteria, the site would be considered Farmland of Local Importance. This is due to its land use (non-irrigated grain). Although the soil units qualify for Prime Farmland, the lack of irrigation precludes that designation (DOC 2008).
- **San Luis Obispo County:** According to the county's Department of Agriculture, the project site and area would be considered Important Farmland classified as "*Farmland of Local Importance* through locally adopted ordinance under 7 CFR 657.5(d)" (SLOC 2008d). The San Luis Obispo County Land Use Ordinance categorizes the proposed CESF site and construction laydown area within the Agriculture, Resource and Open Space Land Use Category with a zoning designation of "Agricultural (AG)" (CESF 2007a).

- **Williamson Act**: The project site is not located in an area that is under a Williamson Act contract.

California Energy Commission staff uses information from governmental agencies to conduct analysis of impacts to agricultural resources. Ordinarily, the DOC's FMMP mapping information is used in Staff Assessments to analyze impacts to important Farmlands in the State. However, although the Carrizo Plains area has been surveyed for important Farmlands, it has not been officially mapped (DOC 2008). As provided for in the CEQA Guidelines Appendix G (Environmental Checklist Form, Item II, Agricultural Resources), "…[i]n determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment (LESA) Model prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland" (CCR 2006). Staff often uses the LESA Model for assessment of impacts to agricultural lands for power generation facilities.

Land Evaluation and Site Assessment (LESA) is a term used to define an approach for rating the relative quality of land resources based upon specific measurable features. 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).

Staff conducted the LESA Model for the proposed 640-acre CESF project site in accordance with the detailed instructions provided in the LESA Model Instruction Manual. Because the impacts to the 380-acre laydown area would last only until completion of construction, and because the applicant has agreed to return the 380-acre laydown area to its pre-construction condition, the temporary use of the laydown area would not contribute to conversion of farmlands in the region, and thus staff did not include this acreage in the LESA analysis.

The completed LESA Model worksheets for the proposed project are included within **APPENDIX LU-1** at the end of this section. The LESA score is based on a scale of 0 to 100. The Final LESA score for the 640-acre CESF site is 61.6. Note that both the LE

and SA subscores for the proposed project site are over 20 points (see **APPENDIX LU-1**). In addition, the 380-acre construction laydown area was not included in the LESA Model for the proposed project, because those lands would not be permanently converted. Subsequent to completion of proposed project construction, the construction laydown area would be returned to its original state (CESF 2007a). Based on the California Agricultural LESA Thresholds[2], a score of 61.6 would result in a significant impact due to the permanent conversion of 640 acres of agricultural lands.

As discussed above, the site is not within any of the FMMP important Farmlands designations. However, based on the final score of the (LESA) Model, the conversion from agricultural land would be significant. According to the Shandon-Carrizo Area Plan, "…[h]istorically, agriculture has been and still is the primary use of land in the planning area…, [i]rrigated production has increased during the last 10 years, particularly in vineyards and alfalfa…," and "…[t]he soil capability of this area is prime farmland if irrigated…" (SLOC 2003a, page 1-2). On February 18, 2008, San Luis Obispo County's Department of Planning and Building provided comments on the AFC. Based on this review of the AFC, the county has acknowledged that "…all three soils found on the subject property…are identified as Class II soils if irrigated (prime by county definitions), which would be lost as a result of this development…" (SLOC 2008a). In addition, according to the San Luis Obispo County Department of Agriculture, the project site and area would be considered Important Farmland classified as Farmland of Local Importance. "Because the soil has approximately nine inches of available water capacity, it is productive farmland for dryland farming even with the area's low rainfall. The site and area have a long and continuous history of use for dry-farmed grain production and for cattle grazing, both important components of the County's agricultural economy..." (SLOC 2008d). According to the county, "at the current time, there is nothing that precludes the continued use of the project site for agricultural use" (SLOC 2008d). In addition, the county conducted the LESA Model for the proposed project and has indicated that based on their analysis and results of the LESA Model, "…the conversion of the site would be considered a significant impact based primarily upon the high storie index (excellent rating), project size (640+ acres), and surrounding agricultural land (>90%)…" (SLOC 2008d). Energy Commission staff have verified the area's soil quality for agricultural production through discussions with both the NRCS (CEC 2008ad) and DOC (DOC 2008). The Shandon-Carrizo Area Plan "Rural Area" Program recommends the Agricultural Preserves Program, which encourage owners of eligible lands to participate in the agricultural preserves program (SLOC 2003a). In addition, in its March 20, 2008 letter to the Energy Commission, the county's Department of Agricultural recommends consideration of feasible mitigation options for farmland conversion (SLOC 2008d).

The direct and indirect impacts of proposed project implementation would be that 640 acres of agricultural land would be permanently converted to a solar farm, which is a non-agricultural use. When agricultural land is converted, the effect can be experienced

[2] California LESA Model Scoring Thresholds (DOC 1997, Table 9):

- 0 to 39 Points Not Considered Significant
- 40 to 59 Points Considered Significant (only if LE and SA subscores are each greater than or equal to 20 points)
- 60 to 79 Points Considered Significant (unless either LE or SA subscore is less than 20 points)
- 80 to 100 Points Considered Significant.

by the residents of the area as a loss of open space, a loss of farmland, and the encroachment of industrial uses into a non-industrial setting. Although the proposed project site does not have an official FMMP Important Farmlands designation, based on the information above and analysis conducted by staff, the site has high potential for agricultural production and conversion of 640 acres of such lands to a non-agricultural use is considered a significant impact.

Staff recommends Condition of Certification **LAND-1,** which requires the project owner to mitigate for the conversion of 640 acres of agricultural land to non-agricultural use by requiring the project to mitigate for loss of agricultural lands at a level not to exceed a one-to-one ratio, which will help ensure that agricultural lands of the same or higher quality are conserved within the county. The components included in Condition of Certification **LAND-1** are based on: 1) similar conditions of certification used on other Energy Commission siting projects (e.g., Starwood, Panoche, and East Altamont) where agricultural land was converted to nonagricultural uses; 2) the Agricultural Land Conservation Program encouraged by the San Luis Obispo County in General Plan Policy AGP16 (SLOC, 2007b, p. 2-34); and 3) coordination with the Land Conservancy of San Luis Obispo County (LCSLO 2008). Staff believes that with the adoption and implementation of **LAND-1**, the impacts of agricultural land conversion would be reduced to less than significant levels, and there would be no net loss of productive agricultural land within San Luis Obispo County. Land use staff considers the effects of the 380-acre construction laydown area on land uses to be temporary, because the area would be restored to pre-construction conditions following the 35 months of CESF construction.

The project site is not located in an area that is under a Williamson Act contract, and the county's AG zoning designation allows for energy production with issuance of an MUP. Therefore, the proposed project would not result in any conflict with Williamson Act contracts or existing agricultural zoning.

In addition, there is a potential for the CESF to necessitate compensation for the loss of sensitive biological resources habitat (see the **Biological Resources** section for detailed analysis of Project impacts to wildlife and plants). Therefore, the conversion of any lands from agricultural production to protected biological resources habitat could result in agricultural land conversion impacts similar to those described above for the 640-acre CESF site. At the time of the writing of this analysis, the specifics (i.e., location, exact ratio, etc.) related to mitigation for the loss of sensitive biological resources habitat for the proposed CESF have not yet been finalized. Therefore, land use staff cannot analyze the impacts of such land conversion on agricultural resources within the county in this Preliminary Staff Assessment. However, upon finalization of the biological resources habitat compensation mitigation for the proposed CESF, staff will conduct impact analysis for loss of agricultural lands. If significant impacts are identified, it is likely that staff will revise the requirements of Condition of Certification **LAND-1** accordingly to include farmland conversion impacts resulting from the proposed CESF's biological resources habitat compensation. Land use staff anticipates incorporating this analysis into the Final Staff Assessment.

Physical Division of an Existing Community

The proposed CESF is located in a rural area of unincorporated San Luis Obispo County. The power plant would be located entirely on private property, on a 640-acre site. Access to the site and the adjacent construction laydown area would be through the existing State Highway 58 and Tracy Lane. No existing roadways or pathways would be removed from service due to the proposed CESF. Seven scattered rural residences are located within a one-mile radius of the proposed CESF site. However, the residences are not located within any established residential communities or developments, and there would be no relocation of these residences as a result of the CESF. In addition, other than the 90-foot transmission line connecting the PG&E Switching Station on the CESF site to PG&E's 230-kV Morro Bay-Midway transmission line, no off-site linear facilities would be constructed as a result of the proposed project. The proposed offsite 90-foot long transmission line segment would connect to a tower located within the existing PG&E Morro Bay-Midway 230 kV transmission line right-of-way, and no new right-of-way acquisition would be required. Therefore, implementation of the proposed project would not result in any impacts associated with the physical division of an existing or established community.

Conflict with Any Applicable Habitat or Natural Community Conservation Plan

The proposed CESF, construction laydown area, and other associated facilities are not situated within the boundaries of an applicable Habitat or Natural Community Conservation Plan. Therefore, no conflicts with such plans are expected. The **Biological Resources** section provides a detailed discussion of LORS applicable to wildlife and plants.

Land Use Plan, Policy, or Regulation

As required by California Code of Regulations, Title 20, Section 1744, Energy Commission staff evaluates the information provided by the project owner in the AFC (and any amendments), project design, site location, and operational components to determine if elements of the proposed project would conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or that would normally have jurisdiction over the project except for the Energy Commission's exclusive authority. As part of the licensing process, the Energy Commission must determine whether a proposed facility complies with all applicable state, regional, and local LORS (Public Resources Code section 25523[d][1]). The Energy Commission must either find that a project conforms to all applicable LORS or make specific findings that a project's approval is justified even where the project is not in conformity with all applicable LORS (Public Resources Code section 25525). When determining LORS compliance, staff is permitted to rely on a local agency's assessment of whether a proposed project is consistent with that agency's zoning and general plan. On past projects, staff has requested that the local agency provide a discussion of the findings and conditions that the agency would make when determining whether a proposed project would comply with the agency's LORS, were they the permitting authority. Any conditions recommended by an agency are considered by Energy Commission staff for inclusion in the proposed conditions of certification for the project.

As part of staff's analysis of local LORS compliance and to determine the county's view of the project's consistency with its General Plan and zoning code, staff sent a letter to the county on February 6, 2008, detailing the potential LORS compliance issues associated with the proposed CESF (CEC 2008n). The letter pointed out that "as stated in the AFC, the project would normally require a Minor Use Permit (MUP) or an unclassified Conditional Use Permit (CUP), but for the exclusive authority of the Energy Commission, and if so, what conditions San Luis Obispo County would attach to this project, were it the permitting agency" (CEC 2008n). In addition, staff requested that the county provide its position on the proposed project's consistency with its General Plan, Zoning Ordinance, and other applicable LORS.

On March 11, 2008, the County Department of Planning and Building sent a supplemental response stating that "…[u]nder Land Use, regarding permitting levels, a Conditional Use Permit is required" (SLOC 2008c). The San Luis Obispo General Plan land use designation for the proposed site is "Agriculture" with a zoning designation of Agriculture (AG), which includes energy production as an unclassified conditional use in the AG zone and electrical generation as an allowable use within the AG zone subject to the approval of a Minor Use Permit (MUP) (SLOC 2003a). As acknowledged in the AFC, the proposed project is consistent with San Luis Obispo County General Plan and zoning designations for the site, with the approval of an MUP but for the exclusive authority of the Energy Commission (CESF 2007a).

In the AFC filed on October 25, 2007, the applicant proposed construction of an administration building with a height of 40 feet (CESF 2007a). The height of this proposed structure would exceed the 35 foot height maximum limit for habitable structures within the county's Agriculture, Rural Lands land use category. As a result, the applicant submitted a Supplemental AFC on July 3, 2008 with a revised structure height of 35 feet, which would be in compliance with the county's zoning requirements regarding structure height (CESF 2008h).

Based on staff's independent review of San Luis Obispo County's applicable LORS documents and information provided by San Luis Obispo County, the proposed CESF would be consistent with applicable land use LORS (see **LAND USE Table 2**) upon implementation of staff's proposed Condition of Certification **LAND-2**, which would ensure that the project is constructed and operated in accordance with the county's zoning code standards regarding MUPs.

LAND USE Table 2
Project Compliance with Adopted Land Use LORS

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Federal	None		
State			
Subdivision Map Act (Public Resources Code Section 66410-66499.58)	Provides procedures and requirements regulating land division (subdivisions) and parcel legality. Regulation and control of the design and improvement of subdivisions have been vested in the legislative bodies of local agencies.	YES	The Project site involves the use of a full 640-acre section of land (Section 28, Township 29, Range 18 East, Mount Diablo Base and Meridian) and not just a portion of it (CESF 2007d). In addition, the proposed project site is located on a single legal parcel of land (APN 072-091-001). Therefore, the site is in compliance with the State Subdivision Map Act. The proposed project site's compliance with the Subdivision Map Act has been verified by San Luis Obispo County (CESF 2007d).
Local			
San Luis Obispo County Land Use and Circulation Elements of the General Plan: Framework for Planning (Inland) (SLOC 2007a)	Chapter 1, Introduction to the Land Use Element A. General Goals: Environment 1. Maintain and protect a living environment that is safe, healthful, and pleasant for all residents by conserving nonrenewable resources and replenishing renewable resources.	YES	The proposed project is the development of a solar energy farm that would produce up to a nominal 177 MW net of power. The power generated by the proposed project would be conveyed into PG&E's electric grid to provide electricity supply for the area's population. Because the proposed project makes use of a renewable resource (i.e., sun light), it is consistent with this goal of the General Plan.
	Chapter 6, Land Use Categories A. Introduction 3. To support preservation of the county's agricultural industry and the soils essential to agriculture.	YES (With Implementation of Condition of Certification **LAND-1**)	As discussed under the section entitled **Farmland Conversion**, the project would convert 640 acres of agricultural land to a non-agricultural use. Although the proposed project site does not have an official FMMP Important Farmlands designation, based on the analysis conducted by staff, the site has high potential for agricultural production and conversion of 640 acres of such lands to a non-agricultural use is considered a significant impact. Staff recommends Condition of Certification **LAND-1**, which requires the project owner to mitigate for the conversion of 640 acres of agricultural land to non-agricultural use. Staff believes that with the adoption and implementation of this condition, the impacts of farmland conversion would be reduced to less than significant levels, and there would be no net loss of productive agricultural land within San Luis Obispo

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
			County. With implementation of **LAND-1**, the proposed project would be consistent with this goal of the county's General Plan.
Agriculture and Open Space Element Chapter 2 – The Agriculture Element	Agricultural Policies (AGP) AGP24: Conversion of Agricultural Land. a. Discourage the conversion of agricultural lands to non-agricultural uses through the following actions: 1. Work in cooperation with the incorporated cities, service districts, school districts, the County Department of Agriculture, the Agricultural Liaison Board, Farm Bureau, and affected community advisory groups to establish urban service and urban reserve lines and village reserve lines that will protect agricultural land and will stabilize agriculture at the urban fringe. 2. Establish clear criteria in this plan and the Land Use Element for changing the designation of land from Agriculture to non-agricultural designations. 3. Avoid land redesignation (rezoning) that would create new rural residential development outside the urban and village reserve lines. 4. Avoid locating new public facilities outside urban village and reserve lines unless they serve a rural function or there is no feasible alternative location within the urban and village reserve lines.	YES (With Implementation of Conditions of Certification **LAND-1** and **LAND-2**)	The San Luis Obispo General Plan land use designation for the proposed site is "Agriculture" with a zoning designation of Agriculture (AG). Except for the exclusive authority of the Energy Commission, the proposed project would be consistent with San Luis Obispo County General Plan and zoning designations with the approval of a Minor Use Permit (MUP) (CESF 2007a). Urban, village and rural reserve lines have been established by the Shandon-Carrizo Area Plan. However, the County of San Luis Obispo concluded in their March 11, 2008 letter to the Energy Commission that it would not be feasible to locate the proposed project within a urban reserve line (URL) or village reserve line (VRL) due to the large size of the proposed project site, the need for proximity to regional transmission lines, and issues related to air quality with favorable access to the sun. (SLOC 2008c). Because the proposed project is a conditionally permitted use under the San Luis Obispo County zoning requirements, changing the land use or zoning designations would not be required for project implementation. Given the exclusive authority of the Energy Commission to license the proposed project, staff has recommended Condition of Certification **LAND-2** to ensure that the proposed project is developed consistent with the county's MUP and zoning requirements. As discussed under the **Farmland Conversion** section, the permanent conversion of 640 acres of agricultural land to a non-agricultural use is a significant impact and therefore not consistent with AGP24. However, staff recommends Condition of Certification **LAND-1**, which requires the project owner to mitigate for the conversion of 640 acres of agricultural land to non-agricultural use. Staff believes that with the adoption and implementation of this condition, the impacts of farmland conversion would be reduced to less than significant levels. With implementation of **LAND-1**, the proposed project would be consistent with county General Plan Policy AGP24.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Energy Element Chapter 4 - Electricity Generation and Transmission	X. Goal: Encourage Renewable Energy Projects Policy 37. The development of sustainable energy sources and renewable energy projects shall be encouraged.	YES	As described above under the discussion for Goal 3 of the County's Framework for Planning (Inland) portion of the General Plan, the proposed project is the development of a solar energy farm that would produce up to a nominal 177 MW net of power from a renewable resource (i.e., sun light). Because the proposed project makes use of a renewable resource and would be developing a renewable energy project, it would be consistent with Policy 37 of the Energy Element of the General Plan.
	Policy 38. Encourage the use of solar electric power generating facilities, especially in areas remote from the utility services and in places where such systems can meet specialized power needs cost effectively.	YES	The proposed project would be located in the Carrizo Plains, which is a remote area of eastern San Luis Obispo County. The siting of a solar farm in this area of the county would make the proposed project consistent with Policy 38 of the Energy Element of the General Plan.
	Policy 39. Encourage and support the development of solar power systems as commercial energy enterprises where visual and environmental impacts can be mitigated.	YES (With Implementation of Condition of Certification **LAND-1**)	As discussed in the **Farmland Conversion** section, the permanent conversion of 640 acres of agricultural land to a non-agricultural use is a significant impact. Staff's proposed Condition of Certification **LAND-1** would require the project owner to mitigate for this conversion and would help ensure that the impacts would be reduced to less than significant levels. Because this environmental impact is mitigable, the development of the proposed CESF would be consistent with Policy 39 of the Energy Element of the General Plan with implementation of **LAND-1**.
San Luis Obispo County Land Use Ordinance Title 22 of the County Code (2007) Chapter 22.06 - Allowable Land Uses and Permit Requirements 22.06.030	Excerpt from Table 2-2 – Allowable Land Uses and Permit Requirements: Agriculture, Resource and Open Space Uses • Electricity generation (Except Wind Energy Conversion Facilities) – Permit Requirement by Land Use Category; Allowable use, subject to the land use permit required by the specific use standards (See 22.32).	YES (With Implementation of Condition of Certification **LAND-2**)	The project site is designated "Agriculture;" the proposed use is an allowable use according to Section 22.30, Standards for Specific Land Uses of the San Luis Obispo County General Plan. The existing zoning designation is Agriculture (AG). Energy production is an unclassified conditional use in the AG zone. According to Section 22.06.010 – 22.06.030 and Section 22.32.060, electrical generation is an allowable (coded A2) use within the AG zone, subject to the approval of an MUP required for a solar generation facility with a footprint greater than 40,000 square feet (CESF 2007a). As acknowledged by both the county and the applicant, the proposed project would need a Conditional Use Permit referred to as an MUP (SLOC 2008c; CESF 2007a), if the project were being permitted by San Luis Obispo County. The proposed project would be consistent with San Luis Obispo County General Plan and zoning designations for the site, with the approval of an MUP. Given the exclusive authority of the Energy Commission to license the project, staff has

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
			recommended implementation of Condition of Certification **LAND-2** to ensure that proposed project is developed consistent with the county's MUP and zoning requirements.
Chapter 22.32 – Electric Generating Plants	22.32.020 - Permit and Application Requirements: This ordinance details the permit and application requirements for all electric generating facilities. 22.32.030 - Development Standards: **Bonding.** Following permit approval and prior to any work on the proposed site, the applicant shall post a surety bond in favor of the County, conditioned on conformance with all applicable conditions, restrictions, and requirements of this Title and any conditions required by the permit. Such guarantee is in addition to any bond required by the state. The total value of this bond will be established through the Conditional Use Permit review and approval process, and will be administered in compliance with Section 22.64.040. **Environmental quality assurance.** An Environmental Quality Assurance Program covering all aspects of construction and operation shall be submitted prior to construction of any project component. This program will include a schedule	UNDETERMINED	In the AFC, the applicant acknowledges the San Luis Obispo County permitting requirements (but for the exclusive authority of the Energy Commission) set forth in this section of the Land Use Ordinance. In addition to proposing Condition of Certification **LAND-2,** staff will continue to work with San Luis Obispo County to determine the level of compatibility with the requirements of this code section.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	and plan for monitoring and demonstrating compliance with all requirements of the Conditional Use Permit. Specific requirements of this Environmental Quality Assurance Program will be determined during the environmental review process and Conditional Use Permit review and approval process. **Clearing and revegetation.** The land area exposed and the vegetation removed during construction shall be the minimum necessary to install and operate the facility. Topsoil must be stripped and stored separately. Disturbed areas no longer required for operation will be regraded, covered with topsoil and replanted during the next appropriate season. **Utility interconnect.** All distribution lines, electrical substations, and other interconnection facilities shall be constructed to the specifications of the utility. A statement from the utility confirming that the proposed interconnection is acceptable shall be filed with the County building inspector prior to the issuance of any building permit. Interconnection shall conform to procedures and standards established by the California Public Utilities Commission. **Other requirements.** Development standards in addition to those specified in this		

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Section and in this Chapter may be imposed through conditions of approval where Minor Use Permit or Conditional Use Permit approval is required.		
Chapter 22.10 – General Property Development and Operating Standards	22.10.090-Height Measurement and Height Limit Exceptions. C. Height limits. 1. Maximum allowed height by land use category. This section of the Code limits the height of habitable structures within the "Agriculture, Rural Lands" land use Category (Subsection #C.1) to 35 feet.	YES	In the AFC filed on October 25, 2007, the applicant proposed construction of an administration building with a height of 40 feet (CESF 2007a). The height of this proposed structure would exceed the 35 foot height maximum limit for habitable structures within the county's Agriculture, Rural Lands land use category. As a result, the applicant submitted a Supplemental AFC on July 3, 2008 with a revised structure height of 35 feet, which would be in compliance with the county's zoning requirements regarding structure height (CESF 2008h). Therefore, the proposed project is consistent with this section of the Land Use Ordinance.

Land Use Compatibility

This section addresses the proposed project's compatibility with other existing land uses in the same setting. Land use compatibility refers to the physical compatibility of planned and existing land uses. For example, nuisance producing land uses such as heavy industry is often physically incompatible with residential land uses. As discussed in detail above under the section entitled **Setting,** the proposed CESF is zoned agriculture (AG) and would be located in an area that consists of agricultural farmland. Surrounding properties are used primarily for agricultural purposes, including scattered rural residences associated with farming activities and lands protected under Williamson Act Contracts. The proposed project would require the removal of all abandoned buildings and farm-related facilities on the project site. Sensitive receptors such as residences and one elementary school are within a one-mile radius of the project site.

When a jurisdictional authority, such as the County of San Luis Obispo, establishes zoning designations to implement its general plan, it is that agency's responsibility to ensure the compatibility of adjacent zoning and permitted uses and incorporate conditions and restrictions that ensure those uses will not result in a significant adverse impact ("minimum of detriment") to surrounding properties. It is therefore assumed that permitted electricity generating uses, or those deemed equivalent to a permitted use, sited on properties zoned Agriculture (AG), are compatible with surrounding uses. Those uses operating under a valid use permit would also be considered compatible.

Administrative or conditional use permitting requirements and project reviews under CEQA are in place to evaluate the compatibility of projects that are not a permitted use or that have elements that may adversely impact public safety, the environment, or that could interfere with or unduly restrict existing and/or future permitted uses. As noted in the discussions above (see **LAND USE Table 2**), under the San Luis Obispo County Land Use Ordinance, electricity generation is an allowable conditional use that is subject to a land use permit which requires specific development and use standards.

Past land uses near the site have consisted of energy facilities. In 1983, Atlantic Richfield Company (ARCO) Solar, Inc. constructed and operated a solar generating energy station adjacent to the proposed CESF site (CESF 23007a). However, solar power was not a competitive source of energy at that time and the facility was dismantled in the late 1990s. Multiple additional solar farm projects also are expected to be developed in the Carrizo Plains area in the near future (see below under the section entitled **Cumulative Impacts and Mitigation**).

As a result, staff concludes that given the past and future projected solar projects in the area, and the allowances for development of solar power in the AG zone, the county would likely view such a land use type to be appropriately sited at the proposed location and consistent with its goals and objectives for development within the Carrizo-Shandon Planning Area.

As acknowledged by both the county and the applicant, the proposed project would need an MUP (SLOC 2008c; CESF 2007a), if the project were being permitted by San Luis Obispo County. Given the exclusive authority of the Energy Commission to license the project, staff has recommended Condition of Certification **LAND-2** to ensure that the

proposed project is constructed and operated consistent with the county's MUP and zoning requirements.

The construction laydown area site is disturbed vacant land and the proposed use as a laydown area would be consistent with uses allowed under the site's Agriculture zoning designation. In addition, project-related activities at this site are temporary and would occur only for the duration of construction activities. Upon completion of construction, the applicant would vacate the site and has agreed to return the 380 acres to pre-construction condition. Therefore, land use impacts resulting from activities at the construction laydown area would be less than significant.

The **Traffic and Transportation** section provides a discussion of vehicular access to the proposed CESF and construction laydown area.

Sensitive Receptors

A proposed siting location may be considered an incompatible use if a new source of pollution or hazard is located within close proximity to a sensitive receptor. From a land use perspective, sensitive receptor sites are those locations where people who would be more adversely affected by pollutants, toxins, noise, dust, or other project-related consequence or activity are likely to live or gather. Children, those who are ill or immune-compromised, and the elderly are generally considered more at risk from environmental pollutants. Therefore, schools, along with day-care facilities, hospitals, nursing homes, and residential areas, are considered to be sensitive receptor sites for the purposes of determining a potentially significant environmental impact. Depending on the applicable code, proximity is defined as "within 1000 feet" of a school (California Health & Safety Code §§42301.6–9) or within 0.25 miles of a sensitive receptor, under CEQA (CCR 2006; CCR 2008). Proximity is not necessarily a determining factor for a potentially significant impact, but is the threshold generally used to require further evaluation.

As described above in the **Setting** section, the proposed CESF would be 0.8 miles northwest of the Carrisa Plains School. In addition, scattered agriculture-related rural residences are in the immediate vicinity of the proposed project site. Given the existing and previous permitted uses in the project area, such as the existing PG&E Carrizo Plain Substation and the previous ARCO solar field, once operational the proposed project would not be incompatible with surrounding sensitive receptors.

From a land use perspective, the siting of the CESF at the proposed location would not be incompatible with surrounding sensitive receptors. The **Air Quality, Hazardous Materials Management, Noise, Public Health, Traffic and Transportation,** and **Visual Resources** sections provide detailed analyses of the noise, dust, public health hazards or nuisance, and adverse traffic or visual impacts on surrounding sensitive receptors, including the Carissa Plains School.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects

of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., tit. 14, section 15130).

As noted in the AFC, existing and proposed projects in the vicinity of the CESF site include residential dwellings, and of the 41 planned and approved projects, six propose new residential construction. Additional projects include minor construction plans and renovations. The closest permitted project is located approximately 0.5 miles to the west of the CESF site and includes the addition of a mobile home. All permitted projects within two miles of the CESF site include manufactured and mobile home permits and/or mobile home foundations. All other proposed projects are located over two miles from the proposed project site (CESF 2007a).

Land uses other than agriculture and farm residences proposed near the project site include two major solar energy generation projects: the Topaz Solar Farm proposed by Optisolar Inc., and the SunPower California Valley Solar Ranch. In July 2008, OptiSolar submitted an application to San Luis Obispo County for a Conditional Use Permit for the 550 MW Topaz Solar Farm (OptiSolar 208). This facility would be adjacent to the northwestern boundary of the CESF and would consist of 6,200 acres of agricultural land, 60 percent of which is currently under Williamson Act contracts (OptiSolar 2008). The Topaz Solar Farm Project is expected to begin power delivery in 2011 and be fully operational by 2013. The SunPower Solar Farm, also under the jurisdiction of San Luis Obispo County, would be located approximately 6.5 miles southwest of the proposed project, and would generate 250 MW in the community of California Valley (PG&E 2008). The Sun Power Solar Farm project is expected to begin power delivery in 2010 and be fully operational in 2012.

The project area has had previous solar/energy-related development. In 1983, Atlantic Richfield Company (ARCO) Solar, Inc. built a 5-MW solar energy generating station east of the CESF site, which had the potential to service up to 400 residential customers (CESF 2007a). At that time, solar energy was not able to compete with lower-priced fossil fuel-based sources of energy and the facility was dismantled in the late 1990s.

The cumulative implementation of the Topaz and SunPower solar projects in the Carrizo Plains would result in the conversion of thousands of acres of lands that are currently in agricultural production, are under Williamson Act Contracts, or have a high potential for agricultural production due to their soil quality. The conversion of these lands would represent a significant adverse cumulative impact, without considering the CESF's proposed conversion of 640 acres.

To mitigate CESF's contribution to the cumulative loss of agricultural lands in the area, staff proposes Condition of Certification **LAND -1**. With implementation of **LAND-1**, staff believes the project's contribution to cumulative impacts would be mitigated to a less than significant level. Condition of Certification **LAND-1** would ensure that the CESF does not contribute to the loss of agricultural lands in the county.

In addition, as acknowledged above under the header entitled **Conversion of Farmland,** there is a potential for the CESF to necessitate compensation for the loss of sensitive biological resources habitat (see the **Biological Resources** section for detailed analysis of Project impacts to wildlife and plants). It is possible that the

conversion of any lands from agricultural production to protected biological resources habitat could result in agricultural land conversion impacts similar to those described above for the 640-acre CESF site. It is also possible that biological resources habitat compensation for the Topaz and SunPower solar projects would be at a similar ratio to the proposed CESF resulting in the conversion of thousands of acres of lands that are currently in agricultural production, are under Williamson Act Contracts, or have a high potential for agricultural production due to their soil quality within the Carrizo Plains. Even without the implementation of the CESF, the combined land conversion impacts of the Topaz and SunPower solar projects would be significant and cumulatively considerable. Upon finalization of the biological resources habitat compensation mitigation for the CESF, staff will conduct the associated impact analysis for the loss of agricultural lands. If significant impacts are identified, it is likely that staff will revise the requirements of Condition of Certification **LAND-1** accordingly to include farmland conversion impacts resulting from the CESF's biological resources habitat compensation. In addition, at that time, staff also will determine if the proposed CESF's biological resources compensation mitigation would result in cumulatively considerable agricultural land conversion impacts. Land Use staff anticipates incorporating this analysis into the Final Staff Assessment.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Comments were provided verbally and in writing regarding the proposed CESF from agencies, organizations, and members of the public prior to the publication of the Preliminary Staff Assessment.

AGENCY COMMENTS

San Luis Obispo County has provided several letters to the Energy Commission regarding land use issues. These issues have been incorporated into and referenced in the **Land Use** section of the Preliminary Staff Assessment (PSA).

PUBLIC COMMENTS

Several members of the public provided verbal comments at public meetings and submitted written letters related to the proposed CESF project. Any land use-related issues brought up in these comments are general in nature, and have been addressed in the **Land Use** section of the PSA. Many of these comments were responded to by Energy Commission staff and/or the applicant either at the public meetings, or in writing.

CONCLUSIONS AND RECOMMENDATIONS

- With the exception of chapter 22.32.030 of the San Luis Obispo County Land Use Ordinance, the CESF with implementation of staff's proposed Conditions of Certification **LAND-1** and **LAND-2** would be consistent with the applicable laws, LORS pertaining to local land use planning and would not generate a significant impact under the California Environmental Quality Act (CEQA) guidelines. Staff will continue to work with San Luis Obispo County to determine the project's consistency with chapter 22.32.030 of the San Luis Obispo County Land Use Ordinance.
- The proposed project would result in the permanent conversion of 640 acres of agricultural land to a non-agricultural use (i.e., a solar farm), which represents a

significant impact. Therefore, staff recommends Condition of Certification **LAND-1,** which requires the project owner to mitigate for the conversion of 640 acres of agricultural land to non-agricultural use.

- The proposed project is consistent with the Shandon-Carrizo Area Plan, and the San Luis Obispo General Plan and Land Use Ordinance as a conditionally permitted use (but for the exclusive authority of the Energy Commission). Staff is proposing Condition of Certification **LAND-2** to ensure that the project is constructed and operated in accordance with the county's minimum Agriculture (AG) zoning code standards.
- The proposed project would not disrupt or divide the physical arrangement of an established community.
- The proposed project does not conflict with any applicable habitat or natural community conservation plans. Please refer to the **Biological Resources** section for a discussion of project-related impacts associated with wildlife and plants.
- The proposed CESF would not be incompatible with existing on-site or nearby uses.
- With the implementation of Condition of Certification **LAND-1,** the proposed project's contribution to the overall significant cumulative land use impacts in the project area would be less than significant.

If the California Energy Commission approves the project, staff is proposing Conditions of Certification **LAND-1** to ensure that the proposed project mitigates for the loss of 640 acres agricultural lands and **LAND-2** to ensure that the project is constructed and operated in accordance with the county's minimum development standards for Electric Generating Plants in the Agriculture (AG) zone, to the extent feasible.

PROPOSED CONDITIONS OF CERTIFICATION

LAND-1 The project owner shall mitigate for the loss of 640 acres of significant farmland, as defined by the California Agricultural Land Evaluation and Site Assessment (LESA) Model (DOC 1997), at a level not to exceed a one-to-one ratio.

Verification: The project owner shall provide a mitigation fee payment to an agricultural land trust such as the Land Conservancy of San Luis Obispo County or any other land trust that has been previously approved by the Compliance Project Manager (CPM) at least 120 days prior to the start of construction. The fee payment will be determined by an independent appraisal conducted on available, comparable, farmland property on behalf of the agricultural land trust. The project owner shall pay all costs associated with the appraisal. The project owner shall provide documentation to the CPM that the fee has been paid and that the 640 acres of farmland and/or easements shall be purchased within three years of start of operation as compensation for the 640 acres of agricultural land to be converted by the CESF. The documentation also shall guarantee that the land/easements purchased by the trust will be located in San Luis Obispo County and will be farmed in perpetuity. If no available land or easements can be purchased in San Luis Obispo County, then the purchase of lands/easements in other Central Valley Counties is acceptable. The project owner shall provide to the CPM

updates in the Annual Compliance Report on the status of farmland/easement purchase(s).

LAND-2 The project owner shall ensure that the project and its associated facilities are constructed and operated in compliance with: the requirements of the San Luis Obispo County Agriculture (AG) zone; and the development standards detailed in Chapter 22.32 of the San Luis Obispo County Land Use Ordinance for Electric Generating Plants.

The project owner shall submit a development plan for the site to the county in sufficient time for review and comment and to the Energy Commission's Compliance Project Manager (CPM) for review and approval prior to the proposed start of construction. The development plan shall include all elements normally required by San Luis Obispo County for review and permitting of a similar project, including site plans, architectural elevations, adjacent land use information, a landscape plan, contour maps, and the required permits (SLOC 2003a).

Verification: At least 90 calendar days prior to the start of construction, including any demolition, grading, or site remediation on the project site, the project owner shall submit the proposed development plan to the county 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.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from the local jurisdiction, along with any changes to the proposed development plan, to the CPM for review and approval.

REFERENCES

CCR 2006. California Code of Regulations, Title 14, Chapter 3 (CEQA Guidelines), §§15000-15387, as amended July 11, 2006.

CCR 2008. California Code of Regulations, Health & Safety Code, §§42301.6-42301.9. Site accessed at: http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=42001-43000&file=42300-42316. February 7, 2008.

CEC2008n - CEC/D. Edwards (tn: 45284) Letter to Victor Hollanda, SLO County Building and Planning Department regarding Environmental Comments. Dated 2/6/2008. Submitted to CEC/ Docket Unit on 2/6/2008.

CEC 2008ac – CEC/N. Vahidi. Record of Conversation – Staff and California Department of Conservation Mapping Unit. Dated August 29, 2008.

CEC 2008ad – CEC/S. Huerta. Record of Conversation – Staff and USDA, Natural Resources Conservation Service. Dated June 17, 2008.

CESF2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

CESF2007d – Carrizo, LLC/A. Lieba URS (tn: 43752) Submittal of Supplemental Information Responses to Data Adequacy Requests. Dated 12/14/2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 12/17/2007.

DOC 1997. California Department of Conservation, Office of Land Conservation. *California Agricultural Land Evaluation and Site Assessment Model* (Instruction Manual). DOC site accessed on January 10, 2008 at: http://www.conservation.ca.gov/dlrp/Pages/qh_lesa.aspx.

DOC 2008. California Department of Conservation, Mapping Unit. E-mail correspondence RE: Important Farmland Category for CESF Project, from Molly Penberth, FMMP Manager, to Negar Vahidi, California Energy Commission Land Use Technical Specialist. Dated August 29, 2008.

LCSLO 2008. Land Conservancy of San Luis Obispo County. E-mail correspondence RE: Farmland Mitigation Options for the CESF, from Bob Hill, Conservation Director, to Negar Vahidi, California Energy Commission Land Use Technical Specialist. Dated September 3, 2008.

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OptiSolar 2008. Topaz Solar Farms LLC, a Subsidiary of OptiSolar Inc. Conditional Use Permit Application for the Topaz Solar Farm. Submitted to the San Luis Obispo County Planning and Building Department. Dated July 18, 2008.

PG&E 2008. Pacific Gas & Electric, New Release August 14, 2008. Site accessed at: http://www.pge.com/about/news/mediarelations/newsreleases/q3_2008/080814.shtml. August 25, 2008.

SLOC 1995. Energy Element. The Land Use and Circulation Elements of the County of San Luis Obispo General Plan. Resolution 95-168 - Adopted April 25, 1995.

SLOC 2003a. Shandon-Carrizo Area Plan. The Land Use and Circulation Elements of the San Luis Obispo County General Plan. Revised January 1, 2003.

SLOC 2003b. San Luis Obispo County Code – Title 22, Chapter 22.06. Allowable Land Uses and Permit Requirements by Land Use Category. January 1, 2003.

SLOC 2007a. Framework for Planning (Inland). The Land Use and Circulation Elements of the San Luis Obispo County General Plan. Revised January 2007.

SLOC 2007b. Agriculture and Open Space Element of the San Luis Obispo County General Plan. Revised January 2007.

SLOC 2008a – SLO County Planning Dept/J. McKenzie (tn: 45443) SLO County Planning Dept Comments on CESF AFC. Dated 2/1/8/2008. Submitted to M Dyas/Docket Unit on 2/22/2008.

SLOC 2008c – SLO County Planning Dept/J. McKenzie (tn: 45618) SLO County Planning Dept Supplemental Comments on CESF AFC. Dated 3/11/2008. Submitted to M Dyas/Docket Unit on 3/11/2008.

SLOC2008d – SLO County Agriculture Dept/ (tn: 45806) SLO County Agriculture Dept Comments on CESF AFC. Dated 3/20/2008. Submitted to M Dyas/Docket Unit on 3/20/2008.

APPENDIX LU-1

CARRIZO ENERGY SOLAR FARM PROJECT SITE LESA MODEL WORKSHEETS

ATTACHED

Table 1A.
Land Evaluation Worksheet

Land Capability Classification (LCC) and Storie Index Scores

	A	B	C	D	E	F	G	H
	Soil Map Unit	Project Acres	Proportion of Project Area	LCC	LCC Rating	LCC Score	Storie Index	Storie Index Score
Yeguas	310	304	0.475	IVs	40	19	60	28.5
Pinspring	310	304	0.475	IVs	40	19	88	41.8
Yeguas	311	16	0.025	IVe	50	1.25	59	1.475
Pinspring	311	16	0.025	IVe	50	1.25	87	2.175
	Totals	640	(Must Sum to 1.0)		***LCC Total***	40.5	***Storie Index Total***	73.95

Table 1B.
Site Assessment Worksheet 1.

Project Size Score

	I	J	K
	LCC Class I - II	LCC Class III	LCC Class IV - VIII
			304
			304
			16
			16
Total Acres			640
Project Size Scores			100

Highest Project Size Score 100

Table 4. Site Assessment Worksheet 2. - Water Resources Availability

A	B	C	D	E
Project Portion	Water Source	Proportion of Project Area	Water Availability Score	Weighted Availability Score (C x D)
1	Carrizo Plain Groundwater Basin	1.0	20	20
2				
3				
4				
5				
6				
		(Must Sum to 1.0)	***Total Water Resource Score***	20

Table 8. Final LESA Scoresheet

A	B		C		D
Factor Name	Factor Rating (0-100 points)	X	Factor Weighting (Total = 1.00)	=	Weighted Factor Rating
Land Evaluation					
1. Land Capability Classification	<Line 1> 40.5	X	0.25	=	10.125
2. Storie Index Rating	<Line 2> 73.95	X	0.25	=	18.487
Site Assessment					
1. Project Size	<Line 3> 100	X	0.15	=	15
2. Water Resource Availability	<Line 4> 20	X	0.15	=	3
3. Surrounding Agricultural Lands	<Line 5> 100	X	0.15	=	15
4. Protected Resource Lands	<Line 6> 0	X	0.05	=	0
			Total LESA Score (sum of weighted factor ratings)		<Line 7> 61.6

NOISE AND VIBRATION

Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The Carrizo Energy Solar Farm (CESF), if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration laws, ordinances, regulations and standards.

However, at this time, staff concludes that the project would cause significant adverse noise impacts in the affected area during both construction and operation. Staff needs for the applicant to prepare a draft noise mitigation plan that demonstrates that the significant noise impacts identified for project construction and operation can be reduced to less than significant levels. Staff will need to evaluate this plan before reaching final conclusions about the project's noise impacts for the Final Staff Assessment (FSA).

INTRODUCTION

The construction and operation of any power plant creates noise or unwanted sound. The character and loudness of this noise, the times of day or night that it is produced, and the proximity of the facility to sensitive receptors all combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts. In some cases, vibration may be produced as a result of power plant construction practices such as blasting or pile driving. The 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 CESF project and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations and standards (LORS). For an explanation of technical terms used in this section, please refer to **Noise Appendix A**, immediately following.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Noise Table 1
Laws, Ordinances, Regulations and Standards

Applicable Law	Description
Federal:	
Occupational Safety & Health Act (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure
U.S. Environmental Protection Agency (U.S. EPA)	Assists state and local government entities in development of state and local LORS for noise
State:	
California Occupational Safety & Health Act (Cal/OSHA): 29 U.S.C. § 651 et seq., Cal. Code Regs., tit. 8, §§ 5095-5099	Protects workers from the effects of occupational noise exposure
Local:	
San Luis Obispo County General Plan, Noise Element	Establishes acceptable noise levels.
San Luis Obispo County Land Use Ordinance, Noise Ordinance	Establishes acceptable noise levels and limits hours of construction.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (OSHA) (29 U.S.C. § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration, (OSHA) adopted regulations (29 C.F.R. § 1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **Noise Appendix A**, **Table A4**, immediately following this section). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

Guidelines are available from the U.S. Environmental Protection Agency (U.S. EPA) to assist state and local government entities in developing state and local LORS for noise. Because there are existing local LORS that apply to this project, the U.S. EPA guidelines are not applicable.

There are no federal laws governing off-site (community) noise.

The Federal Transit Administration (FTA) has published guidelines for assessing the impacts of ground-borne vibration associated with construction of rail projects, which have been applied by other jurisdictions to other types of projects. The FTA-

recommended vibration standards are expressed in terms of the *vibration level*, which is calculated from the peak particle velocity measured from groundborne vibration. The FTA measure of the threshold of perception is 65 vibrational decibel (VdB), which correlates to a peak particle velocity of about 0.002 inches per second (in/sec). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 100 VdB, which correlates to a peak particle velocity of about 0.2 in/sec.

STATE

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its general plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

The State of California, Office of Noise Control, prepared the Model Community Noise Control Ordinance, which provides guidance for acceptable noise levels in the absence of local noise standards. This model also defines a simple tone, or "pure tone," as one-third octave band sound pressure levels that can be used to determine whether a noise source contains annoying tonal components. The Model Community Noise Control Ordinance further recommends that, when a pure tone is present, the applicable noise standard should be lowered (made more stringent) by five A-weighted decibels (dBA).

The California Occupational Safety and Health Administration (Cal/OSHA) has promulgated occupational noise exposure regulations (Cal. Code Regs., tit. 8, §§ 5095-5099) that set employee noise exposure limits. These standards are equivalent to federal OSHA standards (see **Noise Appendix A, Table A4**).

LOCAL

The CESF project site and the project's noise-sensitive receptors are located within an unincorporated area of San Luis Obispo County. Therefore, the Noise Element of the San Luis Obispo County General Plan (SLOC 2008e) and the Noise Ordinance of the San Luis Obispo County Land Use Ordinance (SLOC 2004) apply to this project.

San Luis Obispo County General Plan, Noise Element

The Noise Element of the San Luis Obispo County General Plan limits noise levels from stationary noise sources to 50 dBA L_{eq} (hourly average) during the daytime hours of 7:00 a.m. to 10:00 p.m. and 45 dBA L_{eq} during the nighttime hours of 10:00 p.m. to 7:00 a.m. at the property line of a noise-sensitive receptor (SLOC 2008e). These limits, as specified in Table 3-2 of the noise element, are summarized in **Noise Table 2** below. These requirements apply to operational noise and not to construction noise.

Noise Table 2:
San Luis Obispo County Exterior Noise Limits dBA (L_{eq})

Category	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Residential	50	45

Source: SLOC 2008e, Table 2-3; SLOC 2004, §23.06.042; AFC §5.12.5.3.2, Table 5.12-8

San Luis Obispo County Land Use Ordinance, Noise Ordinance

Similar to the above noise element, the Noise Ordinance of the San Luis Obispo County Land Use Ordinance limits noise levels from stationary noise sources to 50 dBA L_{eq} during the daytime hours of 7:00 a.m. to 10:00 p.m. and 45 dBA L_{eq} during the nighttime hours of 10:00 p.m. to 7:00 a.m. at the property line of a noise-sensitive receptor (SLOC 2004). These limits, as specified in section 23.06.044 of the noise ordinance, are summarized in **Noise Table 2** above.

Section 23.06.042 of this ordinance exempts construction noise from compliance with the above requirements if construction is limited to between the hours of 7:00 a.m. and 9:00 p.m. Mondays through Fridays or 8:00 a.m. and 5:00 p.m. on Saturdays and Sundays.

SETTING

The proposed CESF project site is located west of Simmler and northwest of California Valley, in unincorporated San Luis Obispo County, California. The land use designation of the project site is agricultural (see **Noise Figure 1**). The immediate project area consists of primarily disturbed ranchland, with some residential uses. Sources of noise in the area include vehicle traffic on California State Route 58 (SR-58), natural sounds (birds, insects, dogs, cows, and rustling leaves), and occasional aircraft over flights (CESF 2007a, AFC §5.12.1.2).

Sensitive noise receptors[1] in the vicinity of the project include single-family residences and an elementary school.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and either eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA's guidelines (Cal. Code Regs., tit. 14, App. G) describes some characteristics that could signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

[1] A sensitive noise receptor, also referred to as a noise-sensitive receptor, is a receptor at which there is a reasonable degree of sensitivity to noise (such as residences, schools, hospitals, elder care facilities, libraries, cemeteries, and places of worship).

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, including those receptors that represent the area's minority population.

Staff has concluded that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA, however, is clearly significant. An increase of between 5 and 10 dBA should be considered adverse, but could be either significant or insignificant, depending upon the particular circumstances of a particular case.

Factors to be considered in determining the significance of an adverse impact as defined above include:

1. the resulting noise level;[2]

2. the duration and frequency of the noise;

3. the number of people affected; and

4. the land use designation of the affected receptor sites.

Noise due to construction activities is usually considered to be insignificant in terms of CEQA compliance if:

- the construction activity is temporary; and
- the use of heavy equipment and noisy[3] activities is limited to daytime hours.

Staff uses the above method and threshold to protect the most sensitive populations, including the area's minority population.

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[2] 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.

[3] Noise that draws legitimate complaint.

Applicant's Ambient Noise Monitoring

In order to establish a baseline for the comparison of predicted project noise with existing ambient noise, the applicant has presented the results of an ambient noise survey (CESF 2007a, AFC §5.12.1.2, Table 5.12-2, Figure 5.12-1). This survey was performed from Wednesday, June 13 through Thursday, June 14, 2007, using acceptable equipment and techniques.

Weather during the survey was relatively mild. Wind speeds of 0 to 15 mph were observed during the day, but winds were calm at night and in the early morning. The sky was relatively clear, and humidity was relatively low.

The noise survey monitored existing noise levels at the following five locations, shown in **Noise Figure 2**:

1. Location ML1: Located between two residences at 8710 SR-58 and 8770 SR-58, approximately 7,216 feet southwest of the center of the project's power block. This location represents two of the nearest existing residential receptors to the west of the project site. This location was monitored from 2:29 a.m. to 2:44 a.m., and again from 3:44 p.m. to 3:59 p.m., on June 14, 2007.

2. Location ML3: Located at 9368 SR-58, approximately 6,317 feet northeast of the center of the project's power block, representing one existing residential receptor. This location was monitored only during the daytime from 7:43 p.m. to 7:58 p.m. on June 13, 2007.

3. Location ML7: Located approximately 89 feet south of SR-58 in a parking lot between a residence and a San Luis Obispo County office building. This location is approximately 2.7 miles southeast of the project site. This location was monitored from 4:40 a.m. to 4:55 a.m., and again from 5:08 p.m. to 5:23 p.m., on June 14, 2007.

4. Location LT1: Located at the yard of the Carrisa Plains School, approximately 9,348 feet southeast of the center of the project's power block. This location was monitored continuously from 5:00 p.m. on June 13, through 7:00 p.m. on June 14, 2007.

5. Location SR10: Located near a residence, approximately 1,400 feet west of the project's western boundary. The applicant did not report the date(s) and time(s) of the measurements in the AFC.

As explained above, the noise environment in the vicinity of the project site is dominated by transportation-related and natural sources.

Noise Table 3 summarizes the results of the above ambient noise survey (CESF 2007a, AFC §5.12.1.2; Tables 5.12-2, 5.12-3).

Noise Table 3
Summary of Measured Noise Levels

Measurement Sites	Measured Noise Levels, dBA	
	15-Minute Measurement During Nighttime (10:00 p.m. – 7:00 a.m.) L_{eq}	15-Minute Measurement During Daytime (7:00 a.m. – 10:00 p.m.) L_{eq}
ML1, Residence at 8710 SR-58	43	35
ML3, Residence at 9368 SR-58	Not Recorded	46
ML7, Residence approximately 2,700 feet east of Soda Lake Road, southeast of project site	43	49
SR10, Residence approximately 1,400 feet west of the project site's western boundary	43	35
	Average During Daytime Hours (7:00 a.m. – 10:00 p.m.)[1] L_{eq}	
LT1, Carrisa Plains School	47	

Source: CESF 2007a, AFC §5.12.1.2; Tables 5.12-2, 5.12-3
[1] AFC Table 5.12-3 and staff calculations of average noise levels during measurement period (see Noise Appendix A)

The above noise survey measured the ambient noise levels at ML3 for only 15 minutes between 7:43 p.m. and 7:58 p.m. The survey did not record the daytime ambient noise levels. In order to evaluate the project's noise impact at ML3, staff needed to better understand the existing noise environment at this location. Therefore, staff requested that the applicant measure the ambient noise level at this location during two different times of a 24-hour period, in the morning and in the afternoon. The applicant measured the noise in the morning, in the afternoon, and at night. **Noise Table 4** summarizes these measurements (CESF 2008f).

Noise Table 4
Summary of Applicant Measured Noise Levels at ML3

Measured One-Hour Noise Levels, dBA	
Nighttime Hour L_{eq}	Average During Daytime Hours[1] L_{eq}
54	45

Source: CESF 2008f, Data Response 81
[1] Data Response 81 and staff calculations of average noise levels (see Noise Appendix A)

At the public workshops held for the CESF project, some members of the public stated that they believed the noise survey described in the AFC, which was performed in June 2007, did not measure the ambient noise levels at all of the existing and planned residential receptors near the project site. Therefore, staff asked the applicant to identify all new residences built since June 2007, and all planned residential developments, within the 3-mile radius of the center of the project site. Staff also asked the applicant to conduct a short-term (one-hour) ambient noise survey at these locations during calm weather conditions and provide the resultant noise levels to staff.

The applicant identified two future residences that are planned to be built prior to the start of construction of CESF (labeled Strobridge and Bell Future) and one existing residence (labeled Bell Existing), shown in **Noise Figure 3** (CESF 2008f). The applicant also measured the ambient noise levels at these locations during three different times of a 24-hour period, in the morning, in the afternoon, and at night, as requested by staff. As recorded in this survey, with the exception of wind speed of up to 15 miles per hour during the afternoon measurements at Bell Existing and Bell Future, the weather conditions were calm during the period of the survey.

These newly identified locations are described below.

1. Location Strobridge: APN 072-051-026, approximately 3,230 feet north of the center of the project's power block. This location represents a house which is being built and is expected to be occupied prior to the start of project construction. This location was monitored from 3:15 p.m. to 4:15 p.m. on June 3, from 12:30 a.m. to 1:30 a.m., and again from 8:50 a.m. to 9:50 a.m. on June 4, 2008.

2. Location Bell Future: APN 072-301-001, approximately 10,207 feet west of the center of the project's power block. This location represents a house which is being built and is expected to be occupied prior to the start of project construction. This location was monitored from 6:00 p.m. to 7:00 p.m., and again from 11:00 p.m. to 12:00 a.m. on June 4, and from 8:10 a.m. to 9:10 a.m. on June 5, 2008.

3. Location Bell Existing: APN 072-311-004, approximately 12,356 feet west of the center of the project's power block. This location represents an existing residential receptor. This location was monitored from 4:50 p.m. to 5:50 p.m. on June 4, from 12:15 a.m. to 1:15 a.m. and again from 7:00 a.m. to 8:00 a.m., on June 5, 2008.

Noise Table 5 summarizes these measurements (CESF 2008f).

Noise Table 5
Summary of Applicant-Measured Noise Levels at Newly Identified Receptors

Measurement Sites	Measured One-Hour Noise Levels, dBA	
	Nighttime Hour L_{eq}	Average During Daytime Hours[1] L_{eq}
Strobridge	35	44
Bell Future	28	39
Bell Existing	32	39

Source: CESF 2008f, Data Response 83
[1] Data Response 83 and staff calculations of average noise levels (see Noise Appendix A)

Staff's Ambient Noise Monitoring

At the August 5, 2008 Data Response Workshop, some of the residents living near the proposed project site expressed some concerns about the validity of the above measurements. In their opinion, the above surveys conducted by the applicant did not characterize the existing noise conditions. They requested that staff verify the survey by conducting its own survey. Staff did this (CEC 2008ae).

To better understand the existing noise environment within the project area, staff conducted long-term continuous measurements at four of the nearest monitoring locations, Strobridge, Bell Future, ML7, and Reyes (staff learned about this location just before conducting this survey). Additionally, staff conducted short-term (one-hour) measurements during three times of a 24-hour period at monitoring locations ML1, ML3, SR10, and LT1 (see **Noise Figure 3**). This survey was performed from Tuesday, September 23 through Thursday, September 25, 2008 (CEC 2008ae).

Weather during the survey was relatively mild, with observed nighttime temperatures in the range of 60 to 65 degrees Fahrenheit (°F), and daytime temperatures up to 90°F. Wind speeds of 5 to 15 mph were observed in the daytime from about 11 a.m. to sunset, but wind speeds were 0-5 mph at night and early morning. The sky was clear, and humidity was relatively low.

For each of the measurement locations, the measurement times and the major sources of noise during the survey are described below (CEC 2008ae). Because typically during a long-term survey the measurement equipment is unattended, no one was present to record the sources of noise at the locations where long-term measurements were taken. For the locations of these receptors on a map, please see **Noise Figure 4** below.

1. Location ML1: Staff conducted one-hour measurements at this location from 10:00 p.m. to 11:00 p.m. on September 23, from 9:40 a.m. to 10:40 a.m., and again from 4:00 p.m. to 5:00 p.m. on September 24, 2008. The nighttime noise sources at this location included occasional vehicle traffic on SR-58, insects, coyotes, a nearby horse, and a jet flying overhead. During the morning hours, noise sources were

primarily traffic, children playing nearby, and birds. The afternoon noise sources included wind in the trees, birds, traffic, and the resident driving by.

2. Location ML3: Staff conducted one-hour measurements at this location from 1:11 p.m. to 2:11 p.m. and from 10:00 p.m. to 11:00 p.m. on September 24, and again from 10:00 a.m. to 11:00 a.m. on September 25, 2008. During the afternoon, wind speed increased from zero to 12-15 mph in gusts. The noise sources included insects, especially flies and grasshoppers, and a bird. Goats and horses were observed nearby. At night, crickets were dominant, and the residents' voices could be heard. Horses ran in a nearby pasture, and a resident drove by. In the morning, there were no apparent noise sources except insects and birds. No traffic was present during the daytime measurements.

3. Location SR10: Staff conducted one-hour measurements at this location from 10:00 p.m. to 11:00 p.m. on September 23, from 9:30 a.m. to 10:30 a.m., and again from 3:55 p.m. to 4:55 p.m., on September 24, 2008. The nighttime noise sources included occasional vehicle traffic on SR-58, insects, coyotes, and a jet flying overhead. During the morning hours, the noise sources were primarily traffic and birds. The afternoon noise sources included wind in the trees, birds, and traffic.

4. Location LT1: Staff conducted one-hour measurements at this location from 11:05 a.m. to 12:05 p.m., from 2:35 p.m. to 3:35 p.m., and again from 10:00 p.m. to 11:00 p.m., on September 24, 2008. The morning noise sources included birds in the trees and children leaving classrooms for lunch. A classroom air conditioning unit operated periodically after about 11:50 a.m. The afternoon noise sources included the wind in the trees and the air conditioning unit. Two classes were in session, indoors. At night, the maximum noise levels were elevated due to proximity to the highway (SR-58). The nearby water tank pressure pump was also turned on during the nighttime measurements.

5. Location Strobridge: This location was monitored continuously from 4:00 p.m. on September 23, through 11:00 a.m. on September 25, 2008.

6. Location Bell Future: This location was monitored continuously from 5:00 p.m. on September 23, through 12:00 p.m. on September 25, 2008.

7. Location Reyes: Located at 9330 SR-58, a modular home approximately 4,232 feet northeast of the center of the project's power block, representing one of the nearest existing residential receptors to the project's power block. Staff learned about this location just before conducting this survey (email to staff from Mr. Strobridge on September 17, 2008, at 7:56 P.M.). This location was monitored continuously from 4:00 p.m. on September 23, through 11:00 a.m. on September 25, 2008.

8. Location ML7: This location was monitored continuously from 9:00 a.m. on September 24, through 10:00 a.m. on September 25, 2008.

Noise Table 6 summarizes these measurements (CEC 2008ae).

Noise Table 6
Summary of Staff-Measured Ambient Noise Levels

Measurement Sites	One-Hour Measurements, dBA	
	During Nighttime L_{eq}	Average During Daytime L_{eq}
ML1	43	48
ML3	32	35
SR10	50	50
Measurement Sites	Long-Term Measurements, dBA	
	Average During Nighttime L_{eq}	Average During Daytime L_{eq}
LT1	N/A	47
Strobridge	24	33
Bell Future	25	30
Reyes	33	37
ML7	40	43

Source: CEC 2008ae and staff calculations of average noise levels during measurement period (see Noise Appendix A)

Staff measured the existing ambient noise levels at the most noise-sensitive residential receptors, Reyes and Strobridge, continuously during a period of 44 hours. The applicant conducted only one-hour measurements at Strobridge with no measurements conducted at Reyes. Staff's survey, therefore, more realistically represents the noise environment at the project's most noise-sensitive residential receptors. Therefore, for the locations monitored by staff, staff uses the results of the staff's survey (the data in **Noise Table 6**) to evaluate the project's noise impacts at these locations. Staff's evaluation of the project noise environment shows that the noise environments at Bell Future and Bell Existing are very similar. Therefore, staff only surveyed one of these locations, Bell Future. For Bell Existing, staff uses the data from Bell Future to evaluate the project's noise impacts at this location.

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and normal long-term operation of the project.

Construction Impacts and Mitigation

Construction noise is usually a temporary phenomenon. With the exception of a relatively lengthy construction schedule (35 months), construction of the CESF project is expected to be typical of similar projects in terms of equipment used and other types of activities (CESF 2007a, AFC §5.12.2.1, Appendix P2).

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 applicable local noise LORS do not limit the loudness of construction noise, but staff compares the projected noise levels with ambient levels (please see the following discussion under **CEQA Impacts**).

The applicant commits to performing noisy construction work during the hours of 7:00 a.m. to 7:00 p.m. Mondays through Fridays (CESF 2007a, AFC §§3.4.13.1, 5.9.2.2.1. 5.12.2) in compliance with the San Luis Obispo County Land Use Ordinance. To ensure that these hours are, in fact, enforced, staff proposes Condition of Certification **NOISE-6**.

With implementation of the proposed Condition of Certification **NOISE-6**, the noise impacts of the CESF project construction activities would comply with the noise LORS.

CEQA Impacts

The CESF project construction would occur over a period of 35 months. Typical power plant construction is significantly shorter than this, generally 12 to 16 months. In addition, staff's analysis (below) shows that these activities would more than quadruple the existing ambient noise levels at some of the project's most noise-sensitive receptors. For typical power plants, staff normally considers construction activities that result in ambient noise levels that are as much as doubled to be less than significant. (An increase of 10 dBA is equivalent to doubling the noise level.) However, the loud construction noise resulting in more than quadrupling the ambient levels at some of the residences near the proposed CESF project site for as long as approximately three years has the potential to significantly disturb some of the residents living near the project site. For further analysis and conclusions, please see below.

The applicant predicted construction noise levels in the AFC; they are summarized here in **Noise Table 7**.

Noise Table 7: Predicted Construction Noise Levels in AFC

Receptor	Range of Construction Noise Levels Over 35 Months, L_{eq} (dBA)	Measured Existing Ambient, Average Daytime L_{eq}[3] (dBA)
ML1	58-62[1]	48
ML3	62-66[1]	35
ML7	50-54[2]	43
SR10	59-63[1]	50
LT1	57-61[1]	47

[1] CESF 2007a, AFC Table 5.12-5, Appendix P2
[2] CESF 2007a, AFC Table 5.12-5. Construction noise level at ML7 is not provided to staff. Therefore, staff uses the data available for the nearby receptor labeled SR7.
[3] Noise Table 6, above

On July 3, 2008, the applicant submitted an AFC Supplement to the Energy Commission, proposing some changes to the project. The changes that would affect the project's noise impacts at the project's noise-sensitive receptors include the power block reconfiguration, addition of an emergency generator, addition of limited onsite manufacturing, and demolition of existing structures (CESF 2008h, §§1.2, 1.3, 1.4, 1.5, 2.12).

The applicant has predicted construction noise levels that account for the noise impacts of these proposed changes; they are summarized here in **Noise Table 8**.

Noise Table 8: Revised Predicted Construction Noise Levels

Receptor	Approximate Distance from Center of Power Block (feet)	Range of Construction Noise Levels Over 35 Months, L_{eq}[1] (dBA)	Measured Existing Ambient, Average Daytime L_{eq}[5] (dBA)	Cumulative (dBA)	Change (dBA)
ML1	7,216	53-58	48	54-58	6-10
ML3	6,317	53-59	35	53-59	18-24
ML7	Not Recorded	43-48[2]	43	46-49	3-6
SR10	5,740	55-60	50	56-60	6-10
LT1	9,348	52-56	47	53-57	6-10
Strobridge	3,230	59-65[3]	33	59-65	26-32
Bell Future	10,207	49-55[3]	30	49-55	19-25
Bell Existing	12,356	48-53[3]	30	48-53	18-23
Reyes	4,232	56-62 [4]	37	56-62	19-25

[1] CESF 2008h, Table 2.12-1
[2] CESF 2008h, Table 2.12-1. Construction noise level at ML7 is not provided to staff. Therefore, staff uses the data available for the nearby receptor labeled SR7.
[3] CESF 2008f, Data Response 84; CESF 2008h, Table 2.12-1
[4] CESF 2008q
[5] Noise Table 7, above

Staff uses the data in **Noise Table 8** to evaluate the project's construction noise impacts at the noise-sensitive receptors identified in the table. Since construction noise typically varies with time, it is most appropriately measured by, and compared with, the L_{eq} (energy average) metric.

As seen in **Noise Table 8**, above, construction noise at monitoring location ML1 would range from 53 dBA to 58 dBA. The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, above, is 48 dBA. The addition of the construction noise to the ambient would result in 54-58 dBA, 6-10 dBA above ambient, with an average increase of 8 dBA. Because this is less than doubling the ambient level, staff considers the impact at ML 1 to be less than significant.

Construction noise at monitoring location ML3 would range from 53 dBA to 59 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, is 35 dBA. The addition of the construction noise to the ambient would result in 53-58 dBA, 18-24 dBA above ambient, with an average increase of 21 dBA. An increase of 20 dBA is equivalent to quadrupling the noise level. In a rural environment, such as the CESF project area, where the noise environment is typically quiet, more than quadrupling the ambient noise levels, and as a result, increasing the existing ambient noise levels to as high as 53-58 dBA for as long as 35 months, can potentially be very intrusive. Thus, staff considers the impact at ML3 to be significant.

Construction noise at monitoring location ML7 would range from 43 dBA to 48 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, is 43 dBA. The addition of the construction noise to the ambient would result in 46-49 dBA, 3-6 dBA above ambient, with an average increase of 4.5 dBA. Because this increase is less than 5 dBA, staff considers the impact at ML 7 to be less than significant.

Construction noise at monitoring location SR10 would range from 55 dBA to 60 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, above, is 50 dBA. The addition of the construction noise to the ambient would result in 56-60 dBA, 6-10 dBA above ambient, with an average increase of 8 dBA. Because this is less than doubling the ambient level, staff considers the impact at SR10 to be less than significant.

Construction noise at monitoring location LT1 (Carrisa Plains School) would range from 52 dBA to 56 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, above, is 47 dBA. The addition of the construction noise to the ambient would result in 53-57 dBA, 6-10 dBA above ambient. Because the students are in the classrooms during most of the time, with doors and windows normally closed (CESF 2008a), staff considers this impact to be less than significant.

Construction noise at monitoring location Strobridge would range from 59 dBA to 65 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, is 33 dBA. The addition of the construction noise to the ambient would result in 59-65 dBA, 26-32 dBA above ambient, with an average increase of 29 dBA. An increase of 30 dBA is equivalent to octupling the noise level. In a relatively quiet environment, such as the CESF project area, almost octupling the ambient noise levels, and as the result, increasing the existing ambient noise levels to as high as 59-65 dBA for as long as 35 months, can potentially be very intrusive. Thus, staff considers the construction impact at Strobridge to be significant.

Construction noise at monitoring location Bell Future would range from 49 dBA to 55 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, is 30 dBA. The addition of the construction noise to the ambient would result in 49-55 dBA, 19-25 dBA above ambient, with an average increase of 22 dBA. This increase would result in more than quadrupling the ambient noise level. As explained above, staff considers such an increase to create a significant adverse impact. Therefore, staff considers the project's construction impact at Bell Future to be significant.

Construction noise at monitoring location Bell Existing would range from 48 dBA to 53 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, above, is 30 dBA. The addition of the construction noise to the ambient would result in 48-53 dBA, 18-23 dBA above ambient, with an average increase of 20.5 dBA. Because this is more than quadrupling the ambient noise level, staff considers the impact to be significant.

Construction noise at monitoring location Reyes would range from 56 dBA to 62 dBA (**Noise Table 8**). The average ambient daytime L_{eq} level at this location, as seen in **Noise Table 8**, is 37 dBA. The addition of the construction noise to the ambient would result in 56-62 dBA, 19-25 dBA above ambient. As explained above, staff considers such an increase to create a significant adverse impact. Therefore, staff considers the project's construction impact at Reyes to be significant.

Typically, during construction, construction workload, equipment roster, work schedule, and work locations are constantly changing. Each construction activity typically moves along at a rapid pace, lasting only a few days. Thus, the level and character of the noise produced during construction are almost always changing. It is, therefore, not practical to require the project owner to meet specific noise level limits for construction at the noise receptors listed above.

Nonetheless, staff proposes that the applicant implement additional mitigation measures to mitigate the significant impacts identified above. One example of an additional construction mitigation measure, beyond what have been considered in the applicant's noise modeling, is erection of temporary sound walls. Portable sound walls or massive sound blankets that can be hung from a framing system are commonly used in the industry. Alternatively, barriers can be constructed from sheets of solid plywood and faced with absorptive material (e.g., fiber glass) on the side facing the construction activity. These barriers could be fixed in place or made portable so that the screening can move with the construction activity or construction phase.

Other examples of additional construction mitigation measures include spreading the high peak activities so that they would not occur simultaneously, building temporary earth berms around the construction site or near the affected receptors, implementing additional equipment mufflers, and using quieter equipment. These, among other feasible noise reducing measures used in the industry, can result in meaningful reduction in construction noise.

Staff needs for the applicant to prepare a draft noise mitigation plan that demonstrates that the significant impacts identified above can be reduced to less than significant.

As explained above, for the CESF, staff considers an increase of up to 10 dBA in the ambient levels, resulting from project construction, to be less than significant. Therefore, the draft mitigation plan should demonstrate that project construction would not result in an increase of more than 10 dBA in the ambient levels at the receptors affected by CESF construction. This plan should also describe, in detail, a construction noise modeling that reflects the additional mitigation measures proposed in the plan.

The applicant should submit this plan to staff prior to staff's preparation of the FSA.

If a construction noise mitigation plan has been submitted and staff has concluded that the plan will be effective in limiting construction-related impacts to 10 dBA or less, staff will recommend adoption of Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a noise complaint process to resolve any complaints regarding construction noise. If it is determined that the complaint is project related, the project owner must resolve the issue to the satisfaction of the complainant.

If staff concludes the mitigation plan is effective as described above, staff will propose an additional noise condition of certification in the FSA to require the applicant to conform to the mitigation plan throughout the construction period.

In addition to Conditions of Certification **NOISE-1** and **NOISE-2**, staff proposes Condition of Certification **NOISE-6**, which would limit noisy construction activities to the daytime hours, and Condition of Certification **NOISE-7**, which would require that pile driving (typically the loudest construction activity) be performed using a quieter process (please see the following discussion under “Pile Driving”).

At this time, staff cannot conclude that project construction would create less than significant adverse noise impacts. Staff will need to evaluate the applicant’s noise mitigation plan before drawing further conclusions.

As explained above, staff does not consider the 35-month construction period to be temporary. Therefore, in this analysis, staff has not declared the project’s construction impacts as less than significant, on the basis of the temporary nature of construction activities. Instead, staff has considered the construction impacts resulting in more than doubling the ambient noise levels to be significant.

Limited Nighttime Construction

In addition to construction during the daytime hours, the applicant proposes to perform limited nighttime construction activities (CESF 2007a, AFC §3.4.13.1). The AFC, however, does not address the noise impacts of these proposed nighttime activities at the project’s noise-sensitive receptors. Therefore, staff asked the applicant to evaluate these impacts (CEC 2008ac).

In its response, the applicant stated that the noisy construction activities would be scheduled to occur during the daytime hours, with less noisy activities occurring at night. According to the applicant, the nighttime activities would include, but would not be limited to, refueling equipment, staging material for the following day’s construction activities, quality assurance and quality control, concrete pouring for structural foundations, and power plant commissioning (CESF 2008f). The applicant further stated that these activities would occur from time to time, not on a regular, long-term, basis.

The applicant believes it would be necessary to pour some concrete foundations during the early morning and evening hours on hot summer days. The applicant envisions that this work would commence at 5 a.m. and could continue until 9 p.m. The primary foundations requiring concrete pouring during these extended hours are part of the

power block. To ensure concrete pouring would occur during the above hours, staff proposes Condition of Certification **NOISE-6**.

The applicant concluded that concrete pouring would be at least 10 dBA quieter than the typical daytime construction activities, because only about 10 percent of the daytime equipment would be operating at night. Staff agrees with this and believes that the loudest of the proposed nighttime activities would likely result in noise levels that are approximately 10 dBA lower than the daytime construction noise levels predicted in **Noise Table 8**.

In addition, the nighttime activities would be short-term and temporary, occurring during the hot summer days as opposed to year-round). Concrete pouring and other noisy activities would not occur during late night and the earliest morning hours when people are trying to sleep. Therefore, staff considers the noise impacts of the proposed nighttime construction work to be less than significant. However, to ensure these activities would not create significant adverse noise impacts, in addition to Condition of Certification **NOISE-6**, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**.

With implementation of the proposed conditions of certification, the noise impacts of the nighttime project construction would be less than significant.

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feed water and steam systems, the piping and tubing that comprise the steam path have accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high pressure steam is then raised in the boiler or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a *high pressure steam blow*, is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, are performed several times daily over a period of two or three weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation. Alternatively, high pressure compressed air can be substituted for steam.

High pressure steam blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet. Unsilenced steam blows could be disturbing at the nearest noise-sensitive receptors, depending on the frequency, duration, and noise intensity of venting. With a temporary silencer installed on the steam blow piping, the noise levels can be attenuated by 20 to 30 dBA. Therefore, staff proposes Condition of Certification **NOISE-8** below, which would require the steam blow piping to be equipped with a temporary silencer. This condition would also require that steam blows be conducted only during the daytime hours.

Linear Facilities

The only new offsite linear facility would be an electric transmission line approximately 90 feet long, interconnecting to the existing PG&E Morro Bay–Midway transmission line (CESF 2007a, AFC §§ 1.2.3, 3.1, 3.4.4.1, 3.4.12, 3.4.12.1, 3.6.1, Table 3.4-13).

Construction of linear facilities typically moves along at a rapid pace, thus not subjecting any one receptor to noise impacts for more than two or three days. Further, noisy construction activities would be limited to daytime hours. To ensure that these hours are, in fact, adhered to, in compliance with the LORS, staff proposes Condition of Certification **NOISE-6**.

Pile Driving

It is anticipated that construction of the CESF would require pile driving (CESF 2007a, AFC §5.12.2.1). Pile driving is expected to occur during three consecutive months (CESF 2007a, AFC Table 5.2-9).

Pile driving using traditional techniques can potentially cause significant noise impacts at the nearest noise-sensitive receptors. Staff recommends that pile driving be performed using a quieter process. Staff has identified several commercially available technologies that reduce pile driving noise by 20 to 40 dBA compared to traditional pile driving techniques. These include padded hammers, “Hush” noise-attenuating enclosures, vibratory drivers, and hydraulic techniques that press the piles into the ground instead of hammering them (Eaton 2000, Gill 1983, Ken-Jet, Kessler & Schomer 1980, NCT, WOMA 1999, Yap 1987). To ensure that pile driving noise will not cause annoyance, staff proposes Conditions of Certification **NOISE-6** and **NOISE-7**.

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving. SR10, Strobridge, and Reyes (the closest receptors to the project site) are relatively close to the project site but not close enough to be significantly impacted by vibration.

A vibration level of 0.02 in/sec is typically perceptible, but not typically intrusive. A continuous level of 0.10 in/sec begins to annoy people. Vibration levels from pile driving are typically less than 0.02 in/sec at 650 feet away (Caltrans 2002). The above receptors are at least 3,000 feet away from the power block (where the primary pile driving activities would occur). Due to the relatively far distances between these receptors and the power block, vibration would likely be imperceptible at these receptors.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized applicable LORS that would protect construction workers (CESF 2007a, AFC §5.12.2). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**.

Operation Impacts and Mitigation

The primary noise sources of the CESF project include air-cooled condensers, steam turbine generators, air compressors, electric transformers, and various pumps and fans, with the air-cooled condensers being the dominant sources of noise (CESF 2007a, AFC Table 5.12-6, Appendix P3). Staff compares the projected project noise with the applicable LORS, in this case the Noise Element of the San Luis Obispo County General Plan and the Noise Ordinance of the San Luis Obispo County Land Use Ordinance. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

The applicant proposes the following noise mitigation measures (CESF 2007a, AFC §§3.4.3.3, 5.12):

- acoustical enclosures that house the steam turbine generators
- low-noise air-cooled condenser fans; and
- various pump insulations.

In addition, 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 (CESF 2007a, AFC §5.12.4).

Compliance with LORS

In the AFC, the applicant performed noise modeling to determine the project's noise impacts on sensitive receptors (CESF 2007a, AFC §5.12.2.2.2, Table 5.12-7). Later, the applicant revised this modeling to reflect the project changes proposed in the AFC Supplement. The changes that affected the noise modeling include reconfiguration of the air-cooled condenser units, resulting in a 20 percent reduction in the number of condenser fans and the addition of the emergency generator. The resultant noise predictions are lower than the predictions given in the AFC. Staff agrees with the applicant that these project changes would result in lower noise levels than those in the AFC.

The revised noise predictions are summarized here in **Noise Table 9** (CESF 2008h, Table 2.12-4; CESF 2008q).

Noise Table 9: Revised Predicted Operational Noise Levels, dBA

Receptor	Project	Measured Existing Ambient, Average Daytime L_{eq}[1]	Cumulative	Change
ML1	33	48	48	0
ML3	33	35	37	+2
ML7	17	43	43	0
SR10	36	50	50	0
LT1	29	47	47	0
Strobridge	41	33	42	+9
Bell Future	28	30	32	+2
Bell Existing	26	30	31	+1
Reyes	38 [2]	37	41	+4

[1] NOISE Table 6, above
[2] CESF 2008q, Noise Impact Analysis of Monitoring Location Reyes.

(Staff also used this data to evaluate the project's operational noise impacts at the project's noise-sensitive receptors.)

As explained above, the Noise Element of the San Luis Obispo County General Plan and the Noise Ordinance of the San Luis Obispo County Land Use Ordinance limit noise levels from stationary noise sources to 50 dBA L_{eq} (hourly average) during the daytime hours of 7:00 a.m. to 10:00 p.m. and 45 dBA L_{eq} during the nighttime hours of 10:00 p.m. to 7:00 a.m. at the property line of a noise-sensitive receptor (SLOC 2008e and SLOC 2004).

In many cases, a power plant is intended to operate around the clock for much of the year. The CESF 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 insolation is available (CESF 2007a, AFC §5.12.2.2.1). Because the CESF would operate during the daylight hours, staff evaluated the project's noise impacts with respect to the LORS daytime limit of 50 dBA (L_{eq}). (Please see below for limited nighttime activities.)

As seen in **Noise Table 9**, second column, the project's operational noise levels at the project's noise-sensitive receptors would range from 17 dBA to 41 dBA, below the LORS limit of 50 dBA. Therefore, noise due to the operation of the CESF project would be in compliance with the applicable LORS.

To ensure these predicted noise levels would not be exceeded, staff proposes Condition of Certification **NOISE-4**. Also to ensure compliance, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**.

CEQA Impacts

As explained, the CESF project would operate during the daylight hours. Thus, staff compares the project's noise levels to the existing daytime ambient noise levels at the project's noise-sensitive receptors. (Please see below for limited nighttime activities.)

Typically, daytime ambient noise consists of both intermittent and constant noises. The noise that stands out during this time is best represented by the average noise level, or L_{eq}. Staff's evaluation of the above noise surveys shows that the daytime noise environment in the CESF project area consists of both intermittent and constant noises. Thus, staff compares the project's noise levels to the daytime ambient L_{eq} levels at the project's noise-sensitive receptors.

As seen in **Noise Table 9**, last column, with the exception of Strobridge, project operation would result in a 0-4 dBA increase in the existing ambient noise levels at the project's noise-sensitive receptors. Staff considers an increase of up to 5 dBA as a less-than-significant impact. Staff proposes Condition of Certification **NOISE-4** to ensure that the noise levels due to project operation would not create significant noise impacts at these other locations. Condition of Certification **NOISE-4** requires the project owner to limit the noise to the values specified in **Noise Table 9**. If the noise exceeds those limits, the project owner must implement additional mitigation measures to reduce the noise to a level of compliance. (See Condition of Certification **NOISE-4** for details.)

Noise Table 9 shows that the project's operational noise level of 41 dBA at Strobridge, when combined with the ambient noise level of 33 dBA L_{eq} at this location, would result in 42 dBA L_{eq}, 9 dBA above the ambient. Staff considers an increase of between 5 and 10 dBA to be considered adverse, but such an increase could be either significant or insignificant, depending upon the specific circumstances of a particular case. 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. The project's noise environment is very quiet. Thus, staff considers an increase of between 5 and 10 dBA in the ambient level, resulting from project operation, to be significant if the resultant project plus ambient noise level is above 40 dBA.

Because project operation would elevate the ambient level at Strobridge by 9 dBA and because the project would result in 42 dBA above the recommended limit of 40 dBA, staff considers this impact to be significant. In order to reduce this impact to less than significant, the project plus ambient noise level must not exceed 40 dBA L_{eq} at this

location. To achieve this, the project's operational noise level alone must not be allowed to exceed 39 dBA at this location, 2 dBA below the applicant-proposed level. To ensure this, staff proposes Condition of Certification **NOISE-4**.

To achieve this noise level at Strobridge, additional mitigation measures would need to be implemented. There are many feasible mitigation measures available to the applicant. Examples of these measures include employing quieter equipment, such as super low-noise air cooled condenser fans instead of the low-noise fans currently selected for the project, locating the power block further away from this residence, erecting sound walls around the noisiest equipment, implementing mitigation measures at the Strobridge property, and operating the plant at a lower power output.

Staff needs for the applicant to identify feasible additional mitigation measures in the applicant's draft noise mitigation plan, demonstrating that the project noise level of 41 dBA at Strobridge can be reduced to 39 dBA at this location. Staff's estimate, based on the effect of noise dispersion resulting from distance only, and the above predicted noise level at Strobridge shows that relocating the power block approximately 1,000 feet toward the center of the project site from where it is currently planned to be located (see **Noise Figure 3**) would accomplish this. Staff needs for the applicant to evaluate this alternative in the draft noise mitigation plan.

If staff concludes the noise mitigation plan is effective in limiting the noise impact at Strobridge to less than significant, staff will propose an additional noise condition of certification in the FSA to require the applicant to conform to the mitigation plan throughout the operational life of the project.

At this time, staff cannot conclude that project operation would create less than significant adverse noise impacts. Staff will need to evaluate the applicant's mitigation plan before drawing further conclusions.

Nighttime Maintenance Activities

The applicant proposes to perform limited nighttime project activities. These activities would include routine solar reflector cleaning; operation of the occupied building heating, ventilation, and air conditioning (HVAC) systems; and limited operation of the power block equipment.

Staff asked the applicant to evaluate the noise impacts of these activities at the project's noise-sensitive receptors (CEC 2008ad). The applicant did this and presented the results to staff (CESF 2008i, CESF 2008q).

According to the applicant, the major noise sources anticipated from the reflector cleaning activity would include the engine of the vehicle that would be used to transport the maintenance personnel to the reflectors, a portable lighting plant equipped with a generator that would be mounted to the vehicle's cargo bed, and HVAC systems assumed to be in operation during the nighttime at the occupied administration building and control tower. Also for the purpose of this noise analysis, the applicant assumed ventilation fans for the shop/warehouse building, the maintenance building, and the steam turbine generator enclosures to be in operation. Another source of noise taken

into account in this analysis was the feedwater pump operating to keep the water-steam mixture through the steam lines from freezing during the night (CESF 2007a, AFC §3.4.2; CESF 2008j).

The results of this analysis are summarized below, in **Noise Table 10** (CESF 2008i, Data Response 104; CESF 2008q).

Noise Table 10:
Predicted Noise Levels for Nighttime Maintenance Activities, dBA

Receptor	Project L_{eq}	Measured Existing Nighttime Ambient L_{eq}	Cumulative, Exterior L_{eq}	Change in Exterior Level
ML1	27[1]	43[3]	43	0
ML3	28[1]	32[3]	33	+1
ML7	12[1]	40[3]	40	0
SR10	36[1]	50[3]	50	0
Strobridge	33[1]	24[3]	34	+10
Bell Future	20[1]	25[3]	26	+1
Bell Existing	17[1]	25[3]	26	+1
Reyes	27[2]	33[3]	34	+1

[1] CESF 2008i, Data Response 104
[2] CESF 2008q
[3] Noise Table 6 above

Much like a typical power plant in normal operational mode, the HVAC system, the feedwater pump, and the ventilation fans would mostly generate steady and continuous noise. However, because of the irregular nature of the reflector cleaning activity, the noise from this activity would be mainly intermittent. Therefore, because the nighttime project activities would contribute to both steady and intermittent ambient noise environment, staff evaluates their impacts with regard to the hourly average ambient noise levels, or L_{eq}, at the project's noise-sensitive receptors.

As seen in **Noise Table 10**, with the exception of Strobridge, the resultant increases in the nighttime exterior noise levels at the project's most noise-sensitive receptors would be less than 5 dBA. Staff considers an increase of up to 5 dBA to be less than significant.

The project's noise level at Strobridge, or 33 dBA L_{eq}, when combined with the average nighttime ambient noise level at this location, or 24 dBA L_{eq}, would result in 34 dBA L_{eq}, 10 dBA above the ambient. Because people are normally inside their homes during the

late night and early morning hours, staff believes it is appropriate to evaluate the noise impact of the proposed nighttime activities with respect to the interior noise level at this receptor. The above predicted plant plus ambient noise level represents the noise that would be heard outside the residence. Standard building materials attenuate noise by 15 dBA when windows are fully open and by 20 dBA when windows are partially open (Imperial County 2008). Assuming fully open windows, the noise attenuation provided by the Strobridge house would be 15 dBA. The resultant noise level from the power plant alone would be 18 dBA inside the house. The noise level in a quiet bedroom is typically 30 dBA (please see **Noise Table A1** below). As seen here, the plant would likely be inaudible inside the house at night. Therefore, staff believes the impact at Strobridge would be less than significant.

Also, the predicted nighttime project noise levels (**Noise Table 10**, second column) are below the noise limit of 40 dBA recommended by the California Model Community Noise Control Ordinance for rural environments.

Therefore, the project's nighttime maintenance activities would not create significant adverse noise impacts at the project's most noise-sensitive residential receptors.

Nonetheless, staff needs for the applicant to evaluate the possibility of using an electric-powered vehicle and battery-powered lighting equipment instead of a gasoline-powered vehicle and gasoline-powered lighting equipment for mirror washing. An electric-powered vehicle may result in meaningful noise reduction. Staff needs the applicant to include this evaluation in the draft noise mitigation plan. As seen in **Noise Table 10**, the noise levels from these nighttime activities would be below the LORS nighttime limit of 45 dBA L_{eq} at all of the identified noise receptors. Thus, these activities would be in compliance with the applicable noise LORS.

To ensure compliance, the proposed Condition of Certification **NOISE-4** will require the project owner to limit the noise from the nighttime maintenance activities to the values specified in **Noise Table 10**. If the noise exceeds those limits, the project owner must implement additional mitigation measures to reduce the noise to a level of compliance with those limits.

Also to ensure compliance, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**.

Tonal Noises

One possible source of annoyance could be strong tonal noises. Tonal noises are individual sounds (such as pure tones) which, while not louder than permissible levels, stand out in sound quality. The applicant plans to address overall noise in project design and to take appropriate measures, as needed, to eliminate tonal noises as possible sources of annoyance (CESF 2007a, AFC §5.12.4.1). To ensure that tonal noises do not cause public annoyance, staff proposes Condition of Certification **NOISE-4**.

Linear Facilities

The only new offsite linear facility would be an electric transmission line approximately 90 feet long interconnecting to the existing PG&E Morro Bay–Midway transmission line

(CESF 2007a, AFC §§ 1.2.3, 3.1, 3.4.4.1, 3.4.12, 3.4.12.1, 3.6.1, Table 3.4-13). Noise effects from electrical interconnection lines typically do not extend beyond the lines' right-of-way easements and would be inaudible to receptors. For further discussion, see the **TRANSMISSION LINE SAFETY AND NUISANCE** section of this document.

Vibration

Vibration from an operating power plant could be transmitted through two primary means: ground (groundborne vibration) and air (airborne vibration).

The operating components of the CESF plant would consist of high-speed steam turbine generators and various pumps and fans. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors would be attached to the turbines and generators. Based on experience with numerous previous projects employing similar equipment, staff agrees with the applicant that groundborne vibration from the CESF project would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. None of the project equipment is likely to produce low frequency noise; this makes it highly unlikely that the CESF would cause perceptible airborne vibration effects.

Worker Effects

The applicant acknowledges the need to protect plant operating and maintenance workers from noise hazards and commits to compliance with all applicable LORS (CESF 2007a, AFC §§5.12.2.2.3, 5.12.5). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required and provided. To ensure that plant operation and maintenance workers are adequately protected, Energy Commission staff has proposed Condition of Certification **NOISE-5**.

Temperature Inversion

In meteorology, an inversion is a deviation from the normal change of an atmospheric property with altitude. It almost always refers to a temperature inversion, that is, an increase in temperature with height, or to the layer within which such an increase occurs. An inversion can lead to pollution such as noise being bounced back to near the ground. When an inversion layer is present, for example early in the morning when ground-level air temperatures are cool and high-level air temperatures are warm, if a sound occurs at ground level, the sound wave can bounce off the warmer upper layer and return back to ground level; the sound is therefore heard at a distance much further than normal. In other words, it sounds as if the noise source is closer than it really is.

The project site is located in a quiet rural setting within a basin called the Carrizo Plain. Even though temperature inversion can occur in such a setting, it would be premature, prior to commencement of project operation, to assume this phenomenon will noticeably intensify the noise impacts of the CESF and to require the applicant to consider additional mitigation measures at this time, solely based on this assumption. If inversion proves to noticeably intensify the project's impacts, staff's proposed Condition of Certification **NOISE-4** would reduce its impacts to less than significant. This condition

requires the project's noise levels at the project's noise-sensitive receptors to conform to the limits specified in this condition.

The condition will require the project owner to conduct an ambient noise survey during the plant's full operation at the project's noise-sensitive receptors to determine the project's contribution to the ambient noise levels. If inversion occurs in the Carrizo Plain, it is likely strongest during cold, calm, winter mornings when ground-level air is colder than high-level air and when the winds are calm (Clean Air Plan 2001).

According to Condition of Certification **NOISE-4**, this survey shall take place within 30 days from the time the project first attains a sustained output of 85 percent or higher of its rated capacity. If this happens to take place on a cold, calm, winter day, the survey will likely capture the effects of inversion. If not, this condition of certification would require the survey to be repeated on a cold, calm, winter day. (Staff proposes this approach, as opposed to waiting for such weather conditions to be present to conduct the first survey, because at this time it is not clear during what time of the year the plant would become operational; these weather conditions may not occur within the above 30-day time frame.) If the results from any of these surveys indicate that the power plant average noise levels at the affected receptor sites exceed the specified limits, mitigation measures must be implemented to reduce noise to a level of compliance with those limits.

Based on staff's experience with the past power plant projects, staff believes reasonably feasible mitigation measures are available to achieve compliance. Examples of these measures are installing additional sound insulation on the noisiest equipment, erecting additional sound walls around such equipment, and operating the plant at a lower power output.

Operating the plant at lower than full-power output may result in meaningful noise reduction. On cold winter days (when strong inversion may be present), the project would likely operate at lower than full-power output due to lack of sufficient solar insolation. The air-cooled condensers would not need to operate at full load due to the low air temperatures (cold air provides a better cooling effect than warm air). Thus, fewer condenser cooling fans would likely operate at this time resulting in reduction in the project's overall noise level. This may be sufficient to reduce the project's impacts to less than significant. If not, additional measures must be implemented to achieve this.

CUMULATIVE IMPACTS AND MITIGATION

Section 15130 of the CEQA guidelines (Cal. Code Regs., tit. 14, Chapter 3) requires a discussion of cumulative environmental impacts. Cumulative impacts are two or more individual impacts that, when considered together, compound or increase other environmental impacts. CEQA guidelines require that this discussion reflect the severity of the impacts and the likelihood of their occurrence, but need not provide as much detail as the discussion of impacts solely attributable to the project.

Topaz Solar Farm (TSF) project, a photovoltaic solar power plant, is planned for location on 6,210 acres of land adjacent to the proposed CESF site (CESF 2008j). The TSF project site is to the west, northwest, and north of the CESF project site. As with

any typical photovoltaic power plant, the only major sources of noise for the TSF project during plant operation would include the transformers and inverters, as there would be no thermal or thermal-related components (steam turbines, cooling systems, or related pumps and fans). The transformers and inverters would be located in the center of each photovoltaic block or within the TSF project substation, relatively far away from the CESF project's noise-sensitive receptors. Staff believes that the TSF's major sources of noise would be sufficiently far away from these receptors that they would not create significant impacts when combined with the CESF project noise, beyond the significant impacts identified in previous discussion resulting from the CESF's operation alone.

According to the applicant, construction of these two projects would likely overlap for a period of approximately one to two years (CESF 2008j). During this period, the combined construction noise from these projects would substantially elevate the ambient noise levels at some of the identified residential receptors. At this time, staff cannot conclude that project construction will not contribute to significant adverse cumulative noise impacts on people within the affected area. Staff will need to evaluate the effectiveness of the applicant's noise mitigation plan before drawing further conclusions.

Staff is not aware of any other projects which, when combined with the CESF project, would create direct cumulative noise impact in the project area.

FACILITY CLOSURE

All operational noise from the project would cease when the CESF project closes, and no further adverse noise impact from its operation would be possible. The remaining potential temporary noise source would be the dismantling of the project structures and equipment, as well as any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it could be similarly treated - that is, noisy work could be performed during daytime hours with machinery and equipment that are properly equipped with mufflers. Any noise LORS in existence at that time would apply. Unless modified, applicable conditions of certification included in the Energy Commission decision would also apply.

PUBLIC AND AGENCY COMMENTS

Staff has received noise-related comments from members of the public, notably from Ms. Robin Bell and Mr. Mike Strobridge, two of the residents living near the project site. Staff has addressed those comments in this analysis. For instance, in response to the public concerns, staff asked the applicant to identify all the existing and planned residential projects within a 3-mile radius of the center of the project site. The applicant did this. Staff has incorporated these newly identified receptors in this analysis. Also in response to the public concerns, staff conducted an independent ambient noise survey and has used the results of this survey to prepare this analysis.

In this analysis, staff has addressed both construction and operation impacts during the daytime and nighttime. Staff's proposed conditions of certification, combined with the staff's additional condition of certification to be included in the FSA requiring the project

owner to conform to the staff approved applicant's noise mitigation plan would mitigate the project's noise impacts to less than significant. Prior to preparation of the FSA, the applicant needs to submit this mitigation plan to staff for staff's evaluation.

In addition to the above comments, staff recently received a comment from Mr. Strobridge on November 8, 2008, that points to a document related to the adverse health effects of exposure to excessive noise (Strobridge 2008). This document concludes that exposure to loud noise can cause serious health problems. Staff believes the requirements embedded in the following conditions of certification and the additional condition of certification to be included in the FSA would mitigate the noise impacts to well below the levels that typically cause serious adverse health effects.

CONCLUSIONS

Staff concludes that the CESF project, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration LORS.

However, at this time, staff concludes that the project would cause significant adverse noise impacts on people within the affected area during both construction and operation. Staff needs for the applicant to prepare a draft noise mitigation plan that demonstrates that the significant noise impacts identified for project construction and operation can be reduced to less than significant. Staff will need to evaluate this plan before drawing further conclusions for the FSA.

PROPOSED CONDITIONS OF CERTIFICATION

NOISE-1 Prior to the start of ground disturbance, the project owner shall notify all residents within three miles of the center of the project site and one-half mile of the linear facilities, by mail or by other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project. If the telephone is not staffed 24 hours a day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction where it is visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: At least 15 days prior to the start of ground disturbance, the project owner shall transmit to the compliance project manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed and describing the method of that notification. This communication shall also verify that the telephone number has been established and posted at the site and shall provide that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- attempt to contact the person(s) making the noise complaint within 24 hours;
- conduct an investigation to determine the source of noise in the complaint;
- if the noise is project related, take all reasonably feasible measures as acceptable to the CPM to reduce the source of the noise; and
- submit a report documenting the complaint and actions taken. The report shall include: a complaint summary, including the final results of noise reduction efforts and, if obtainable, a signed statement by the complainant, stating that the noise problem has been resolved to the complainant's satisfaction.

Verification: Within five days of receiving a noise complaint, the project owner shall file a Noise Complaint Resolution Form, shown below, with both the local jurisdiction and the CPM, that documents the resolution of the complaint. If mitigation is required to resolve the complaint, and the complaint is not resolved within a three-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is performed and complete.

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high (above permissible) noise levels during construction in accordance to the applicable OSHA and Cal/OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit the noise control program to the CPM. The project owner shall make the program available to Cal/OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to plant operation alone to exceed an average of 33 dBA measured at or near monitoring location ML1 (8710 SR-58), an average of 33 dBA measured at or near monitoring location ML3 (9368 SR-58), an average of 17 dBA measured at or near monitoring location ML7 (identified in **Noise Figure 2**), an average of 29 dBA measured at or near monitoring location LT1 (Carrisa Plains School), an average of 36 dBA measured at or near monitoring location SR10 (identified in **Noise Figure 2**), an average of 39 dBA measured at or near monitoring location Strobridge (APN 072-051-026), an average of 28 dBA measured at or near monitoring location Bell Future (APN 072-301-001), an average of 26 dBA measured at

or near monitoring location Bell Existing (APN 072-311-004), and an average of 38 dBA measured at or near monitoring location Reyes (9330 SR-58).

Also, The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that nighttime project maintenance activities will not cause the noise levels due to plant maintenance alone to exceed an average of 27 dBA L_{eq} measured at or near monitoring location ML1, an average of 28 dBA L_{eq} measured at or near monitoring location ML3, an average of 12 dBA L_{eq} measured at or near monitoring location ML7, an average of 36 dBA L_{eq} measured at or near monitoring location SR10, an average of 33 dBA L_{eq} measured at or near monitoring location Strobridge, an average of 20 dBA L_{eq} measured at or near monitoring location Bell Future, an average of 17 dBA L_{eq} measured at or near monitoring location Bell Existing, and an average of 27 dBA L_{eq} measured at or near monitoring location Reyes.

No new pure-tone components shall be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints[4].

A. When the project first attains a sustained output of 85 percent or higher of its rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring locations ML1, ML3, ML7, SR10, LT1, Bell Existing, Bell Future, Strobridge and Reyes or at closer locations acceptable to the CPM in order to measure the power plant's contribution to the exterior noise levels at these receptors. If possible, this survey shall be conducted during a cold winter day when winds are calm. This survey during the power plant's full-load operation shall also include the measurement of one-third octave band sound-pressure levels to ensure that no new pure-tone noise components have been caused by the project.

   The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, that is closer to the plant (for example, 400 feet from the plant boundary). This measured level will then be mathematically extrapolated to determine the plant noise contribution at the affected residence. The character of the plant noise shall be evaluated

[4] A *legitimate complaint* refers to a noise caused by the CESF project, as opposed to another source, as verified by the CPM. A legitimate complaint constitutes either: a violation by the project of any noise condition of certification, which is documented by another individual or entity affected by such noise; or a minimum of three complaints over a 24-hour period that are confirmed by the CPM, the project owner, or any local or state agency that would, but for the exclusive jurisdiction of the Energy Commission, otherwise have the responsibility for investigating noise complaints or enforcing noise mitigation.

at the affected receptor locations to determine the presence of pure tones or other dominant sources of plant noise.

B. If the above survey does not take place on a cold, calm, winter day, the project owner shall repeat the above survey during a cold winter day when winds are calm.

C. If the results from any of the noise surveys indicate that the power plant average noise levels at the affected receptor sites exceed the values mentioned in this condition of certification during the above-specified time periods, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

D. If the results from any of the noise surveys indicate that pure tones are present, mitigation measures shall be implemented to eliminate those pure tones.

Verification: The first survey shall take place within 30 days (or when otherwise approved by the CPM) from the time the project first attains a sustained output of 85 percent or higher of its rated capacity. If the second survey is needed (as described above), it shall take place when the plant is operating at a sustained output of 85 percent or higher of its rated capacity. Within 15 days after completing each of the surveys, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above-listed noise limits and a schedule, subject to CPM approval, for implementing those measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey (conducted after implementation of the above mitigation measures), the project owner shall submit to the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

NOISE-5 Following the project's attainment of a sustained output of 85 percent or greater of its rated capacity, the project owner shall conduct an occupational noise survey to identify any noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations, section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures to be employed in order to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal/OSHA upon request.

CONSTRUCTION RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy construction work relating to any project features shall be restricted to the times delineated below, unless a special permit has been issued by San Luis Obispo County:

Mondays through Fridays:	7:00 a.m. to 9:00 p.m.
Saturdays and Sundays:	8:00 a.m. to 5:00 p.m.

Also, concrete pouring for foundations shall be restricted to the times delineated below, unless a special permit has been issued by San Luis Obispo County:

Mondays through Fridays:	5:00 a.m. to 9:00 p.m.
Saturdays and Sundays:	8:00 a.m. to 5:00 p.m.

Haul trucks and other engine-powered equipment shall be equipped with adequate mufflers. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that these restrictions will be observed throughout the construction of the project.

PILE DRIVING MANAGEMENT

NOISE-7 The project owner shall perform pile driving using a quieter process than the traditional pile driving techniques to ensure that noise from these operations does not cause annoyance at monitoring locations ML1, ML3, ML7, SR10, LT1, Bell Future, Bell Existing, Strobridge, and Reyes.

Verification: At least 15 days prior to first pile driving, the project owner shall submit to the CPM a description of the pile driving technique to be employed, including calculations showing its projected noise impacts at monitoring locations ML1, ML3, ML7, SR10, LT1, Bell Future, Bell Existing, Strobridge, and Reyes.

STEAM BLOW RESTRICTIONS

NOISE-8 The project owner shall equip the steam blow piping with a temporary silencer. The project owner shall conduct steam blows only during the hours of 7:00 a.m. to 9:00 p.m.

Verification: At least 15 days prior to the first high pressure steam blow, the project owner shall submit to the CPM drawings or other information describing the temporary steam blow silencer and a description of the steam blow schedule.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

CESF Energy Center Project
(07-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).

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NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on a noise-sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that A-weighting of sound intensities best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, they nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (*Effects of Noise on People*, U.S. Environmental Protection Agency, December 31, 1971).

In order to help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** has been provided to illustrate common noises and their associated sound levels, in dBA.

Noise Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the noise level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location (often used for an existing or pre-project noise condition for comparison study).
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.
Source: *Guidelines for the Preparation and Content of Noise Elements of the General Plan*, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.	

Noise Table A2
Typical Environmental and Industry Sound Levels

Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
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 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). The rules for decibel addition used in community noise prediction are:

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 C.F.R. § 1910.

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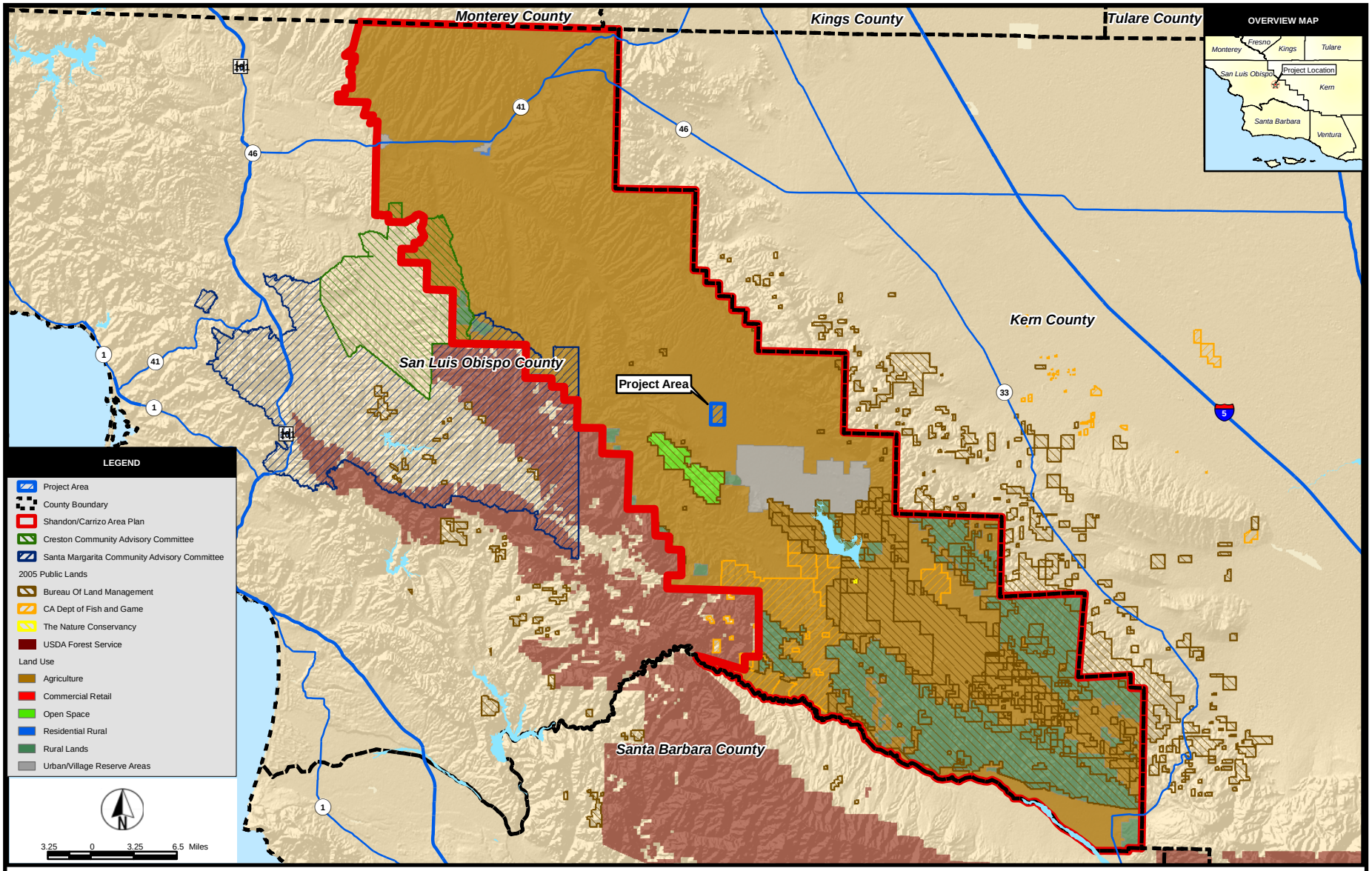
NOISE AND VIBRATION - FIGURE 1

Carrizo Energy Solar Farm Project - Jurisdictional Boundaries and Land Uses Surrounding Carrizo Energy Solar Farm

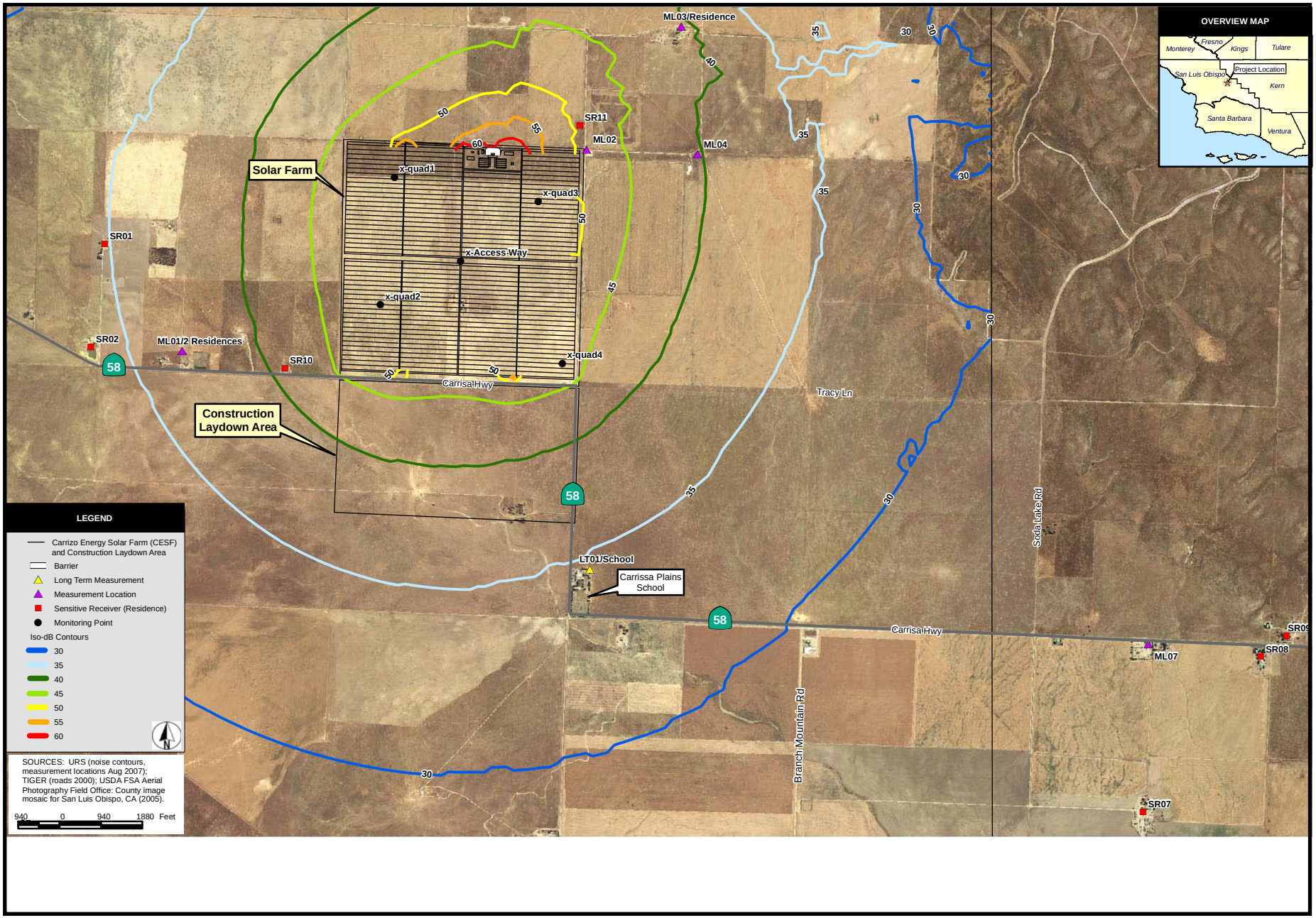


SOURCES: ESRI (counties, shaded relief, roads); California Resources Agency (public lands 2005); Shandon-Carrizo-South Planning Area (area plan and land use).

SOURCE: AFC Figure 5.9-1

NOISE AND VIBRATION - FIGURE 2

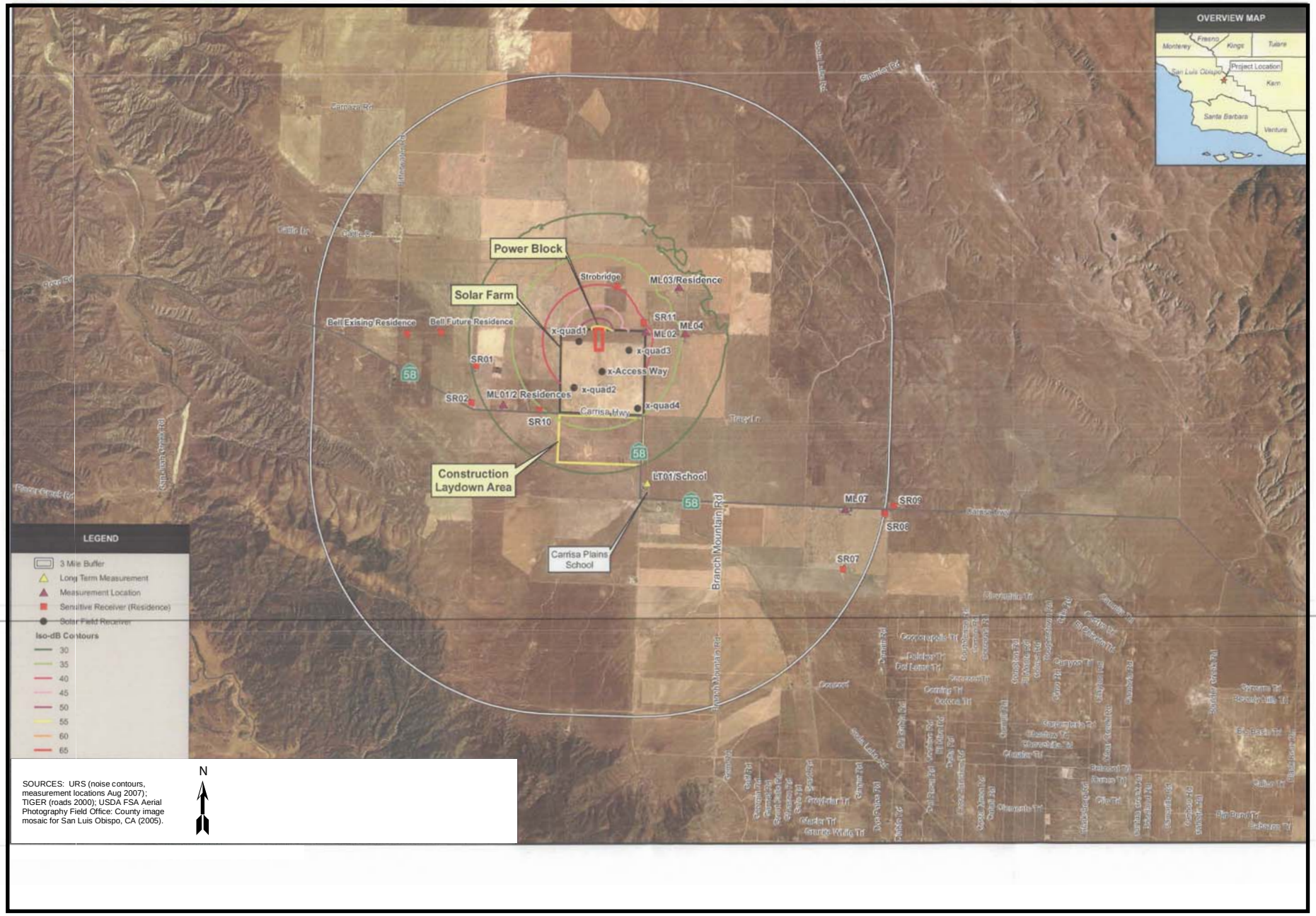
Carrizo Energy Solar Farm Project - Noise Contours



SOURCE: AFC Figure 5.12-1

NOISE AND VIBRATION - FIGURE 3

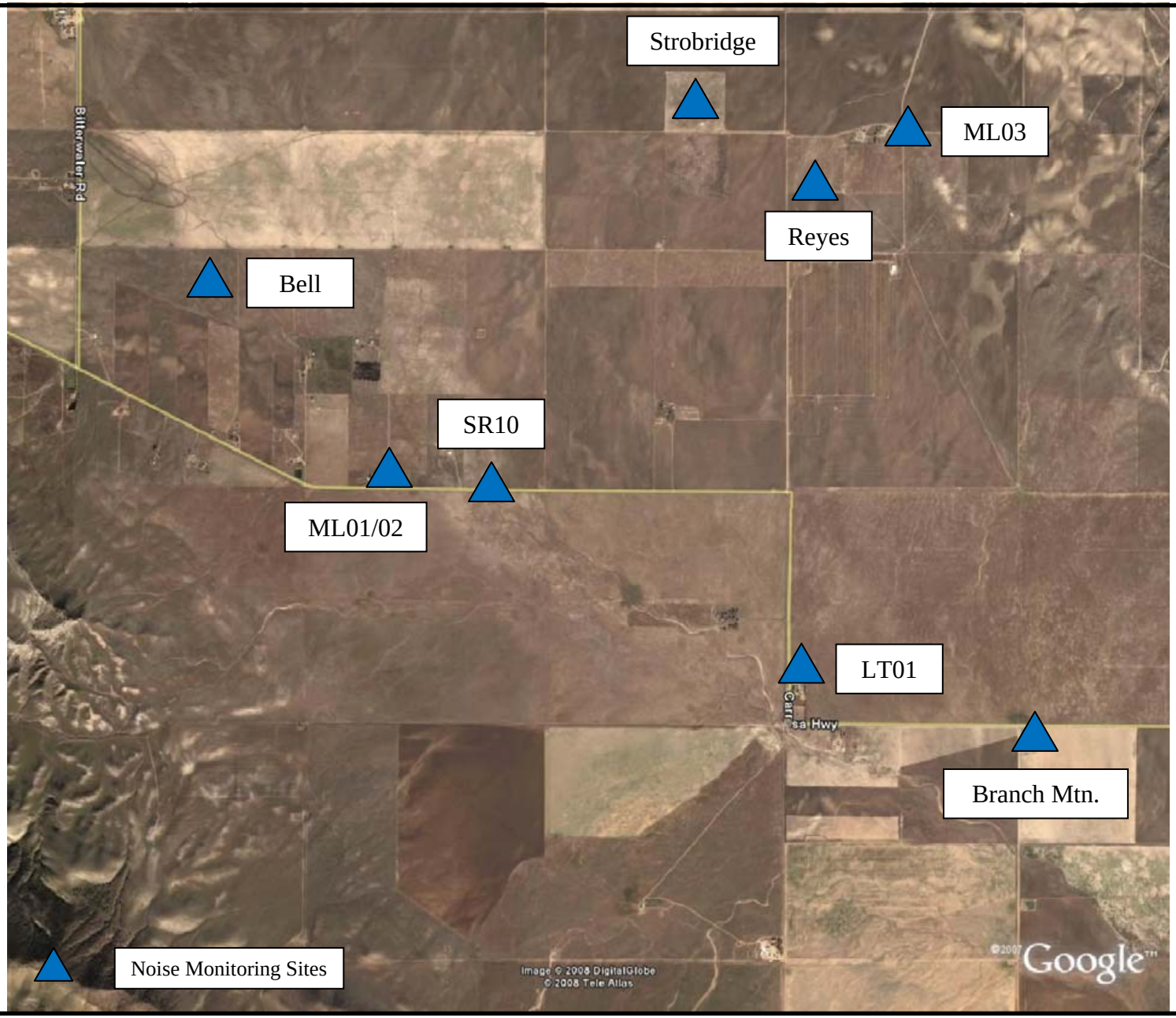
Carrizo Energy Solar Farm Project - Noise Contours



SOURCE: 2008f Data Response Set 2 Figure 1

NOISE AND VIBRATION - FIGURE 4

Carrizo Energy Solar Farm Project - Ambient Noise Measurement Locations



SOURCE: CEC 2008ae - Figure1

PUBLIC HEALTH

Obed Odoemelam, Ph.D.

SUMMARY AND CONCLUSIONS

Staff has analyzed the potential public health risks from the toxic air pollutants associated with construction and operation of the proposed Carrizo Energy Solar Farm project (CESF) and does not expect that there would be any significant adverse cancer or short- or long-term health effects. The toxic pollutants considered in this analysis are "noncriteria" pollutants for which there are no established air quality standards. (The potential for significant public health impacts from the other group of pollutants for which there are specific air quality standards i.e., "criteria" pollutants is discussed in the **Air Quality** section with particular regard to those for which existing area levels exceed their respective air quality standards).

INTRODUCTION

The purpose of this **Public Health** analysis is to determine if toxic emissions from the proposed Carrizo Energy Solar Farm project would have the potential to cause significant adverse public health impacts or violate standards for public health protection in the project area. The project would consist of approximately 195 solar power concentrating units using the collected solar energy to generate approximately 177 megawatts (MW) of electricity without the emissions associated with combustion of fossil fuels such as natural gas. The only source of the toxic air pollutants of concern in this analysis is the diesel emergency firewater pump, which would normally be operated for only short periods in the testing mode to ensure reliability if needed. These pollutants would occur as particulate diesel exhaust whose related health risk would depend on the amount emitted.

The toxic pollutants (or noncriteria pollutants) addressed in this analysis are noncriteria pollutants (i.e., pollutants for which there are no specific air quality standards). The other pollutants for which there are such air quality standards are known as criteria pollutants. If potentially significant health impacts are identified for the noncriteria pollutants considered in this analysis, staff would evaluate mitigation measures to reduce such impacts to less-than-significant levels.

Although the emission and exposure levels for criteria air pollutants are addressed in the **Air Quality** section for informational purposes, staff has included **Attachment A** at the end of this **Public Health** section to provide specific information on the nature of their respective health effects. The discussion in the **Air Quality** section focuses mainly on the potential for exposure above the applicable standards and the regulatory measures necessary to mitigate such exposures with particular emphasis on carbon monoxide, ozone, and particulate matter for which existing area levels exceed their respective air quality standards.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

PUBLIC HEALTH Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (42 U.S. Code section 7412)	Requires new sources which emit more than ten 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 (MACT).
State	
California Health and Safety Code sections 39650 et seq.	These sections mandated the California Air Resources Board (CARB) and the Department of Health Services to establish safe exposure limits for toxic air pollutants and identify pertinent best available control technologies. They also required that the new source review rule for each air pollution control district include regulations that require new or modified procedures for controlling the emission of toxic air contaminants.
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 Code of Regulations, Title 22, Section 60306	Requires that whenever a cooling system uses recycled water in conjunction with an air conditioning facility and a cooling tower that creates a mist that could come into contact with employees or members of the public, a drift eliminator shall be used and chlorine, or other, biocides shall be used to treat the cooling system re-circulating water to minimize the growth of Legionella and other micro-organisms.
Local	
San Luis Obispo County Air Pollution control District Rule 218	Requires safe exposure limits for Toxic Air Pollutants (TACs), use of best Available Control Technology (BACT) and New Sources Review (NSR).

The impacts on public and worker health from accidental releases of hazardous materials are examined in the **Hazardous Materials Management** section while the health and safety impacts from electric and magnetic fields are addressed in the **Transmission Line Safety and Nuisance** section. Pollutants released from the project in wastewater streams are discussed in the **Soils and Water Resources** section. Facility releases in the form of hazardous and non-hazardous wastes are addressed in the **Waste Management** section.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section describes staff's method of analyzing the potential health impacts of toxic pollutants together with the criteria used to determine their significance.

METHOD OF ANALYSIS

The toxic emissions addressed in this **Public Health** section are those to which the public could be exposed during project construction and routine operation. If such toxic contaminants are released into the air or water, people may come in contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

The ambient air quality standards for the criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, are set to ensure the safety of everyone including those with heightened sensitivity to the effects of environmental pollution in general. Since noncriteria pollutants do not have such standards, a process known as a health risk assessment is used to determine if people might be exposed to them at unhealthy levels. The risk assessment procedure consists of the following steps:

- Identification of the types and amounts of hazardous substances that a source could emit into the environment;
- Estimation of worst-case concentrations of project emissions into the environment using dispersion modeling;
- Estimation of the amounts of pollutants to which people could be exposed through inhalation, ingestion, and dermal contact; and
- Characterization of the potential health risks by comparing worst-case exposures to safety standards based on known health effects.

For CESF and other sources, a screening-level risk assessment is initially performed using simplified assumptions intentionally biased toward protecting public health. That is, an analysis is designed that overestimates public health impacts from exposure to the emissions. In reality, it is likely that the actual risks from the project would be much lower than the risks estimated by the screening-level assessment. This overestimation is accomplished by identifying conditions that would lead to the highest, or worst-case risks, and then assuming them in the study. The process involves the following:

- using the highest levels of pollutants that could be emitted from the source;
- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer models which predict the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be highest;
- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses); and
- assuming that an individual's exposure to cancer-causing agents would occur over a 70-year lifetime.

A screening-level risk assessment would, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances, which could present a health hazard from non-inhalation pathways of exposure (see California Air Pollution Control Officers Association (CAPCOA) 1993, Table III-5). When these substances are present in facility emissions, the screening level analysis is conducted to include the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (CAPCOA 1993, p. III-19).

The risk assessment process addresses three categories of health impacts: acute (short-term) health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Acute effects are temporary in nature, and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic health effects are those that result from long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from ten to one hundred percent of a lifetime (from seven to seventy years). 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 (CAPCOA 1993, p. III-36). This means that such exposure limits would serve to protect such sensitive individuals as infants, school pupils, the aged, and people suffering from illnesses or diseases, which make them more susceptible to the effects of toxic substance exposure. The RELs are based on the most sensitive adverse health effects reported in the medical and toxicological literature, and include specific margins of safety, which address the uncertainties associated with inconclusive scientific and technical information available at the time of standard setting. They are, therefore, intended to provide a reasonable degree of protection against hazards that research has not yet identified. Each margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant exposures that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection can be expected if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety is assumed to exist between the predicted exposure and the estimated threshold 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 conformance with CAPCOA guidelines, the health risk assessment assumes that the effects of the individual substances are additive for a given organ system (CAPCOA 1993, p. III-37). In those cases where the actions may be synergistic (that is where the effects are greater than the sum), this approach may underestimate the health impact in question.

For carcinogenic substances, the health assessment considers the risk of developing cancer and conservatively includes the previously noted assumption that the individual

would be continuously exposed 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 terms of chances per million of developing cancer and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (known as “potency factor”, and established by the California Office of Environmental Health Hazard Assessment), and the length of the exposure period. Cancer risks for individual carcinogens are added together to yield the total cancer risk from the source being considered. The conservative nature of the screening assumptions used means that actual cancer risks are likely to be considerably lower than those estimated.

The screening-level analysis is performed to assess worst-case public health risks associated with the proposed project. If the screening analysis were to predict a risk of no significance, no further analysis would be necessary. However, if the risk were to be above the significance level, further analysis, using more realistic site-specific assumptions would be performed to obtain a more accurate estimate of the public health risk in question.

SIGNIFICANCE CRITERIA

Commission staff assesses the health effects of exposure to toxic emissions by first considering the impacts on the maximally exposed individual. This individual is the person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above. If the potential risk to this individual is below established levels of significance, staff would consider the potential risk as also less than significant anywhere else in the project area. As described earlier, noncriteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, as well as cancer (long-term) health effects. The potential significance of project health impacts is determined separately for each of the three categories of health effects.

Acute and Chronic Noncancer Health Effects

Staff assesses the significance of noncancer health effects by calculating a “hazard index” for the exposure being considered. A hazard index is a ratio obtained by comparing exposure from facility emissions to the reference (safe) exposure level for the toxicant. A ratio of less than one would signify a worst-case exposure below the safe level. The hazard indices for all toxic substances with the same types of health effect are added together to yield a total hazard index for the source being evaluated. This total hazard index is calculated separately for acute and chronic effects. A total hazard index of less than one indicates that the cumulative worst-case exposure would be within safe levels. Under these conditions, health protection would be assumed even for sensitive members of the population. In such a case, staff would assume that there would be no significant non-cancer public health impacts from project operations.

Cancer Risk

Staff relies upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Health & Safety Code, §§ 25249.5

et seq.) for guidance in establishing the level of significance for its assessed cancer risks. Title 22, California Code of Regulations, section 12703(b) states in this regard, 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 risk level is equivalent to a cancer risk of ten in one million, or $10x10^{-6}$. An important distinction from the provisions in Proposition 65 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 from the source in question. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than with Proposition 65.

As noted earlier, the initial risk analysis for a project is normally performed at a screening level, which is designed to overstate actual risks, so that health protection can be ensured. When a screening analysis shows the cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. If facility risk, based on refined assumptions, were to exceed the significance level of ten in one million, staff would require appropriate measures to reduce risk to less than significant. If, after all risk reduction measures have been considered, a refined analysis still identifies a cancer risk of greater than ten in one million, staff would deem such risk to be significant, and would not recommend project approval.

SETTING

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 emission plume from a facility may affect elevated areas before lower terrain areas, because of 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 influences population density and, therefore, the number of individuals potentially exposed to the project’s emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination.

SITE AND VICINITY DESCRIPTION

According to the information from the applicant, (CESF 2007a, pp. 3-2, 5.9-1, 5.16-1, 5.16-2, and Appendix Q), the proposed project site is a 650-acre fenced-in land parcel west of the town of Simmler and northwest of the town of California Valley in San Luis Obispo, California. The site and the surrounding area are zoned for agricultural uses but for which power-generating facilities are allowed. The project location is within a valley between the Temblor and Caliente mountain ranges and 10 miles northwest of Soda Lake. The site is generally flat, and slopes gently to the southwest at elevations of 2,014 feet to 2,064 above sea level. The project area has few residences with only three within a three-mile radius. The nearest of these is approximately 400 feet northeast of the northeastern corner of the property line. There are only two sensitive receptor locations (Carrisa Plains School and Carrisa Plains Farm Community Center) within a three-mile radius. Sensitive receptor locations are those housing sensitive individuals such as the elderly, school pupils and individuals with respiratory diseases who, as

previously noted, are usually more sensitive to the effects of environmental pollutants than the general public. Staff holds all projects to the same health standards, whether proposed for a major population center, with many sensitive receptors, or a sparsely populated area (as with the proposed project) with relatively few.

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 increase.

The proposed project site is in an area of hot summers, mild winters, and relatively low precipitation, as it is separated from the rainier and cooler coastal regions by the coastal mountain ranges. This climate is strongly influenced by the large-scale warming and sinking of the air in the semi-permanent subtropical high-pressure center over the Pacific Ocean. This high-pressure system blocks out most mid-latitude storms except in the winter when most of the area's eight-nine inches of rainfall occurs. The yearly maximum temperature averages 76.2°F while the minimum averages 40.4°F (CESF 2007a pp.5.2-2 and 5.3-3).

Because of the area's winds of low speeds (with little seasonal variation), the atmosphere has a limited capacity to disperse the area's air contaminants from the points of generation to other locations. Strong atmospheric temperature inversions frequently occur especially in the late mornings and early afternoons. These inversions severely limit vertical air mixing and result in the buildup of air pollutants by restricting their movement from the ground level to the upper atmosphere out of the air basin. Atmospheric stability is a measure of the turbulence that influences such pollutant dispersion. Mixing heights (the height above ground level below which the air is well mixed and in which pollutants can be effectively dispersed) are lower during the morning hours because of temperature inversions, which are followed by temperature increases in the warmer afternoons. Staff's **Air Quality** section presents a more detailed discussion of the area's meteorology as related to pollutant dispersion.

EXISTING AIR QUALITY

The proposed site is within the jurisdiction of the San Luis Obispo County Air Pollution Control District (SLOCAPCD). By examining average toxic concentrations from representative air monitoring sites in California 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. It should be noted for perspective that the overall lifetime cancer risk for the average individual is about 1 in 3, or 330,000 in one million, which includes the risks from an area's toxic pollutants as well as other cancer-causing agents.

There is no toxic emission data for the immediate project area but the levels in a similar agricultural setting could be used for perspectives on the background air toxics-related contribution to the normal background cancer risk of 1 in 3 or 330,000 in a million. The

most representative of the closest monitoring sites in this case in this case would be data from the CARB toxic air monitoring station on First Street in Fresno, Kern County, approximately 57 miles north of the project site. Based on the levels of toxic air contaminants measured at this monitoring station in 2000, a background cancer risk of 225 in one million was calculated. The risk had been 497 in one million based on 1991 data and 314 in one million based on 1995 data (CARB 2001). The pollutants, 1, 3-butadiene and benzene, emitted primarily from mobile sources, were the two highest contributors to risk and together accounted for over half of the total. The risk from 1, 3-butadiene was about 73 in one million, while the risk from benzene was about 68 in one million. Formaldehyde accounts for about 12 percent of the ambient cancer risk determined for Fresno, with a risk of about 26 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources, such as the proposed CESF.

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 toxic pollutants and associated cancer risks during the past few years. The potential risk from CESF and similar sources should best be assessed in the context of their potential addition to these background risk levels.

The criteria pollutant-related air quality for the project area is assessed in the **Air Quality** section by adding the existing levels (as measured at area monitoring stations), to the project-related levels, and comparing the resulting levels with the applicable air quality standards. Public health protection would be ensured only through specific technical and administrative measures that ensure below-standard exposures when the project is operating. It is such a combination of measures that is addressed in the **Air Quality** section.

IMPACTS

POTENTIAL IMPACTS OF PROJECT'S NONCRITERIA POLLUTANTS

The health impacts of the noncriteria pollutants of specific concern in this analysis can be assessed separately as construction-phase impacts and operational-phase impacts.

Construction Phase Impacts

Possible construction-phase health impacts, as noted by the applicant (CESF 2007a, pp. 5.2-13, through 5.2-17, and Appendix 1-A), are those from human exposure to the windblown dust from site excavation and grading, and emissions from construction-related equipment. The dust-related impacts may result from exposure to the dust itself as PM10, or PM 2.5, or exposure to any toxic contaminants that might be adsorbed on to the dust particles. As more fully discussed in the **Waste Management** section, results of the applicant's site contamination assessments (CESF 2007a, p.5.14-1, and Appendix Q) showed no areas of possible chemical contamination from past agricultural or other uses. This means that particulate-related chemical exposures would be unlikely during the site preparation and project erection phases.

The applicant has specified the mitigation measures necessary to minimize construction-related fugitive dust as required by SLOCAPCD Rule 403, (CESF 2007a, p.5.2-22 and 5.2-44). The only soil-related construction impacts of potential significance would result from the possible impacts of PM10, or PM 2.5 as a criteria pollutant for the 35-month construction period. As noted earlier, the potential for significant impacts from these and the other criteria pollutants is assessed in the **Air Quality** section where the requirements for the identified mitigation measures are presented as specific conditions of certification.

The exhaust from diesel-fueled construction and other equipment has been established as a potent human carcinogen. Thus, construction-related emission levels should be regarded as possibly adding to the carcinogenic risk of specific concern in this analysis. Appendix I (CESF 2007a) presents the diesel emissions from the different types of equipment to be used in the construction phase. Staff considers the recommended control measures specified in **Air Quality** Condition of Certifications (AQ-SC3, and AQ-SC4) as adequate to minimize any construction related cancer risk during the construction period.

Operational Impacts

The main health risk from operation of the proposed solar project would be associated with emissions from the occasional testing of its emergency diesel firewater pump engine to ensure its operability in case it is needed. The toxicants from such diesel combustion would be attached to the emitted particulate matter and can induce both short-term and long-term health effects when inhaled. The short-term effects include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in long function, and inflammation of lungs. The status of diesel exhaust as a human carcinogen (cancer-causing agent) has been established by OEHHA from human and nonhuman studies. Since every exposure to a carcinogen is presently assumed to pose a specific risk of cancer (unlike non-cancer health impacts whose health effects are assumed to result from exposure above safe thresholds), the cancer end point is commonly used as the most sensitive measure of the acceptability of a source of both carcinogenic and non-carcinogenic pollutants. This cancer-related sensitivity accounts for the significance of cancer risk assessments in environmental risk assessments.

Using the previously noted cancer risk assessment approach, the applicant established a maximum risk of 0.061 in one million for the expected maximum from the intended use of the project's diesel firewater pump. This maximum risk was predicted to occur at a point 115 feet from this fire pump and coinciding with a location on an unpaved road on the northern boundary of the property lines. This risk represents the level of the proposed project's contribution to the area's cumulative cancer risk and is well below staff's significance criterion of 10 in one million for assessing either the significance of the incremental risk in question or the potential for significant risk additions of a cumulative nature. The total hazard index for chronic exposures was calculated as 0.0002, which is well below staff's significance criterion of 1.0. There presently is insufficient scientific data for establishing an acute hazard index for diesel exhaust. The results from the applicant's cancer risk assessment (presented in staff's **PUBLIC HEALTH Table 1**) were provided to staff along with documentation of the assumptions

used (CESF 2007a, pp. 5.16-2, through 5.16-17 and Appendix R). This documentation included:

- pollutants considered;
- emission levels assumed for the pollutants involved;
- dispersion modeling used to estimate potential exposure levels;
- exposure pathways considered;
- the cancer risk estimation process;
- hazard index calculation; and
- characterization of project-related risk estimates.

Staff has found these assumptions to be acceptable for use in this analysis and has validated the applicant's findings with regard to the numerical public health risk estimates expressed either in terms of the hazard index for each non-carcinogenic pollutant, or a cancer risk for estimated levels of the carcinogenic pollutants.

PUBLIC HEALTH Table 2
Operation Hazard/Risk

Type of Hazard/Risk	**Hazard Index/Risk**	Significance Level	Significant?
Chronic Noncancer	0.0002	1.0	No
Individual Cancer	0.061×10^{-6} [(a)]	10.0×10^{-6}	No

Staff's summary of information from CESF 2007a pp. 5.16-5 and Appendix R.

CUMULATIVE IMPACTS

The applicant has provided a listing of names and addresses of facilities that could be permitted within a five-mile radius of CESF, and staff has considered the cumulative effects of two other additional solar projects including Optisolar's Topaz Solar Farm and Sun Power's California Valley Solar Ranch. As with all areas, the pollutants from these and existing area sources should be seen as contributing to the existing background levels thereby adding to the normal background cancer and noncancer impacts. The present approach to regulating this group of pollutants is to ensure that further additions from identifiable sources are maintained within less-than-significant levels.

As previously noted, the maximum impact location for the diesel fire pump-related CESF emissions of concern would be the spot where pollutant concentrations would theoretically be highest. Even at this location, staff does not expect any significant CESF-related changes in lifetime risk to any person, given the calculated incremental cancer risk of only 0.0061 in one million, which staff regards as not potentially contributing significantly to the average lifetime individual cancer risk of 330,000 in one million.

The maximum long-term noncancer health impact from the project (represented as a chronic hazard index of 0.0002) is well below staff's significance level of 1.0 at the

location of maximum impact suggesting an insignificant contribution to the incidence of the area's noncancer health symptoms from cumulative toxic exposures. Given the similarity in operations of CESF and the other two proposed area solar projects, their respective long-term impacts would be at the insignificant levels as calculated for CESF in terms of cancer and noncancer risks. The cumulative impacts of combined operations would therefore, not add significantly to cumulative area exposures to the noncriteria pollutants of concern in this analysis. The cumulative impacts from emission of the criteria pollutants are addressed in the **Air Quality** section.

VALLEY FEVER RISK IN THE PROJECT AREA

Construction and operation of the proposed project would pose a risk of valley fever to workers, operators, and the general public who could inhale the airborne spores of the fungus (of the *Coccidioides* species), which is the causative agent of valley fever. It is the growth of these inhaled spores in the lungs that constitutes valley fever whose symptoms could be mild with influenza-like symptoms and rashes, or life-threatening from pneumonia, lung nodules, and meningitis. The risk of serious symptoms is highest for individuals with weakened immune systems such as pregnant women, and those with several types of pre-existing diseases.

Since the fungal spores at issue are disseminated while attached to dust, and it is not possible to prevent all risks of infection in the project area and other parts of the southern United States where the fungus occurs naturally, staff recommends dust control measures. This infection risk is minimized through measures that require soil disturbance and dust generation work to be performed in a manner that limits and avoids dust generation to the extent reasonably possible. The **Air Quality** staff seeks to minimize this risk through recommended Conditions of Certification **AQ-SC3** and **AQ-SC4**, which would minimize dust generation in the construction phase. In addition, **AQ-SC7** limits vehicle speeds, and would require dust and erosion control procedures to be developed and implemented during the operational phase to minimize dust and infection risk in the area. Also, Conditions of Certification **Soil and Water-1, 2, and 3** would require the applicant to develop and implement plans for managing drainage and controlling wind and water erosion through various Best management Practices (BMP). The BMP would include maintaining soil in a wet condition during grading, and using soil covers or binding agents outside of periods of disturbance including project operations. Staff considers the recommended **Air Quality** and **Soil and Water** conditions of certification as adequate to minimize valley fever risk as possible in the project and other areas where the *Coccidioides* fungus occurs naturally.

COMPLIANCE WITH LORS

The toxic pollutant-related cancer and noncancer risks from CESF operation reflect the effectiveness of regulatory controls on the diesel fire pump that would emit these pollutants during the intended test periods. Since these risk estimates are much below the significance levels in the applicable LORS, staff concludes that the related operational plan would comply with these LORS. The Air Quality staff's recommended Conditions of Certification against the risk of valley fever should be adequate to reduce such a risk to levels expected for the project and other areas where the causative agent occurs naturally.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has not received any agency or public comments on the public health aspects of the proposed project.

CONCLUSIONS AND RECOMMENDATIONS

Staff has determined that the toxic air emissions from the construction and operation of the solar energy-utilizing CESF are at levels that do not require mitigation beyond the intended emission controls. The conditions for ensuring compliance with all applicable air quality standards are specified in the **Air Quality** section for the area's criteria pollutants.

PROPOSED CONDITION OF CERTIFICATION

Staff recommends approval of the proposed project with respect to the health impacts of concern in this analysis and proposes no conditions of certification.

REFERENCES

CARB (California Air Resources Board) 1996. California Toxic Emissions Factors (CATEF) Database for Natural Gas-Fired Combustion Turbine Cogeneration, 1996.

California Air Resource Board (CARB). 2002. California Air Quality Data, http://www.arb.ca.gov/aqd/aqd.htm.

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

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

CESF 2007a-Carrizo, LLC/P. Fontana (tn: 43007). Application for Certification for the Carrizo Energy Solar Farm Project. Submitted to the California energy commission, on October 25, 2007

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

ATTACHMENT A - CRITERIA POLLUTANTS

OZONE (O_3)

Ozone is not directly emitted from specific sources but is formed when reactive organic compounds (VOCs) interact with nitrogen oxides in the presence of sunlight. Heat speeds up the reaction, typically leading to higher concentrations in the relatively hot summer months. Ozone is a colorless, reactive gas with oxidative properties that allow for tissue damage in the exposed individual. The effects of such damage could be experienced as respiratory irritation that could interfere with normal respiratory function. Ozone can also damage plants and other materials susceptible to oxidative damage.

The U.S. EPA revised its federal ozone standard on July 18, 1997 (62 Fed. Reg. 38856), based on health studies that had became available since the standard was last revised in 1979. These new studies showed that adverse health effects could occur at ambient concentrations much lower than reflected in the previous standard, which was based on acute health effects experienced during heavy exercise. In proposing the new standard, the EPA identified specific health effects known to have been caused by short-term exposures (of one to three hours) and prolonged exposure (of six to eight hours) (61 Fed. Reg. 65719). However, a 1999 federal court ruling blocked implementation of the ozone 8-hour standard, which is yet to be implemented.

Acute health effects from short-term exposures include a transient reduction in pulmonary function, and transient respiratory symptoms including cough, throat irritation, chest pain, nausea, and shortness of breath with associated effects on exercise performance. Other health effects of short-term or prolonged O_3 exposures include increased airway responsiveness (which predisposes the individual to bronchoconstriction induced by external stimuli such as pollen and dust), susceptibility to respiratory infection (through impairment of lung defense mechanisms), increased hospital admissions and emergency room visits, and transient pulmonary inflammation.

Generally, groups considered especially sensitive to the effects of air pollution include persons with existing respiratory diseases, children, pregnant women, and the elderly. However, controlled exposure data on people in clinical settings have indicated that the population at greatest risk of acute effects from ozone exposures as children and adults engaged in physical exercise. Children are most at risk because they are active outside, playing and exercising, during summer when ozone levels are highest. Adults who are outdoors and engaging in heavy exertion in the summer months are also among the individuals most at risk. This happens because such exertion increases the amount of O_3 entering the airways and can cause O_3 to penetrate to peripheral regions of the lung where lung tissue is more likely to be damaged. These individuals, as well as those with respiratory illnesses, such as asthma, can experience a reduction in lung function and increased respiratory symptoms, such as chest pain and cough, when exposed to relatively low ozone levels during periods of moderate exertion.

CARBON MONOXIDE (CO)

Carbon monoxide is a colorless, odorless gas, which is a product of inefficient combustion. It does not persist in the atmosphere, being quickly converted to carbon dioxide. However, it can reach high levels in localized areas, or "hot spots".

CO reduces the oxygen carrying capacity of the blood, thereby disrupting the delivery of oxygen to the body's organs and tissues. Persons sensitive to the effects of carbon monoxide include those whose oxygen supply or delivery is already compromised. Thus, groups potentially at risk to carbon monoxide exposure include persons with coronary artery disease, congestive heart failure, obstructive lung disease, vascular disease, and anemia, the elderly, newborn infants, and fetuses (CARB 1989, p. 9). In particular, people with coronary artery disease were found to be especially at risk from carbon monoxide exposure (CARB 1989, p. 9). Tests conducted on patients with confirmed coronary artery disease indicated that exposure to low levels of carbon monoxide during exercise can produce significant cardiac effects. These effects include chest pain (angina) and electrocardiographic changes indicative of effects on the heart muscle (CARB 1989, p. 6). Such changes can limit the ability of patients with coronary artery disease to exert themselves even moderately. Therefore, the statewide carbon monoxide one-hour and eight-hour standards were adopted in part to prevent aggravation of chest pain. Additionally, however, the standards are intended to prevent decreased exercise tolerance in persons with peripheral vascular disease and lung disease, impaired central nervous system functions, and effects on the fetus (Cal. Code Regs. Tit. 7, sec 70200).

PARTICULATE MATTER (PM)

Particulate matter is a generic term for particles of various substances, which occur as either liquid droplets or small solids of a wide range of sizes. Particles with the most potential to adversely affect human health are those less than 10 micrometers (millionths of a meter) in diameter (known as PM10), which may be inhaled and deposited within the deep portions of the lung (PM10). PM may originate from anthropogenic or natural sources such as stationary or mobile combustion sources or windblown dust. Particles may be emitted directly to the atmosphere or result from the physical and chemical transformation of gaseous emissions such as sulfur oxides, nitrogen oxides, and volatile organic compounds. PM10 may be made up of elements such as carbon, lead, and nickel; compounds such as nitrates, organics, and sulfates; and complex mixtures such as diesel exhaust and soil fragments. The size, chemical composition, and concentration of ambient PM10 can vary considerably from area to area and from season to season within the same area.

PM10 can be grouped into two general sizes of particles, fine and coarse, which differ in formation mechanisms, chemical composition, sources, and potential health effects. Fine-mode particles are those with a diameter of 2.5 micrometers or less (PM2.5), while the coarse-mode fraction of PM consists of particles ranging from 10 micrometers down to 2.5 micrometers in diameter.

Coarse-mode PM10 is formed by crushing, grinding, and abrasion of surfaces, and in the course of reducing large pieces of materials to smaller pieces. Coarse particles consist mainly of soil dust containing oxides of silicon, aluminum, calcium, and iron; as

well as fly ash, particles from tires, pollen, spores, and plant and insect fragments. Coarse particles normally have shorter lifetimes (minutes to hours) and only travel over short distances (of less than tens of kilometers). They tend to be unevenly distributed across urban areas and have more localized effects than the finer particles.

PM2.5 is derived both from combustion by-products, which have volatilized and condensed to form primary PM2.5, and from precursor gases reacting in the atmosphere to form secondary PM2.5. Components include nitrates, organic compounds, sulfates, ammonium compounds, and trace elements (including metals) as well as elemental carbon such as soot. Major sources of PM2.5 are fossil fuel combustion by electric utilities, industry and motor vehicles, vegetation burning, and the smelting or other processing of metals. Dry deposition of fine mode particles is slow allowing such particles to often exist for long periods of time (of from days to weeks) in the atmosphere and travel hundreds to thousands of kilometers. They tend to be uniformly distributed over urban areas and larger regions and are removed from the atmosphere primarily by forming cloud droplets and falling out within raindrops.

The health effects of PM10 from any given source usually depend on the toxicity of its constituent pollutants. The size of the inhaled material usually determines where it is deposited in the respiratory system. Coarse particles are deposited most readily in the nose and throat area while the finer particles are more likely to be deposited within the bronchial tubes and air sacs, with the greatest percentage deposited in the air sacs. Until recently, PM10 particles had been considered to be the major fraction of airborne particulates responsible for various adverse health effects. The PM10 fraction is known to be capable of penetrating the thoracic and alveolar regions of the human and animal lungs. The PM2.5 fraction, however, was found to pose a significantly higher risk for health. This is due to their size and associated deposition and retention characteristics in the respiratory tract, enabling it to penetrate and deposit within the deeper alveolar regions of the lung. The following aspects of PM2.5 deposition all contribute to the more serious health effects attributed to smaller particles:

- The deposition of PM2.5 favors the periphery of the lungs, which is especially vulnerable to injury for anatomical reasons.
- Clearance of the PM2.5 from within the deeper reaches of the lungs is a much slower process than from the upper regions. Consequently, the residence time is longer, implying longer exposure, and hence greater risk.
- The human anatomy further allows the penetration of the superficial tissues by PM2.5 and entry into the bodily circulation without much effort in the periphery of the lungs.

Many epidemiological studies have shown exposure to particulate matter capable of inducing a variety of health effects, including premature death, aggravation of respiratory and cardiovascular disease, changes in lung function and increases in existing respiratory symptoms, effects on lung tissue structure, and impacts on the body’s respiratory defense mechanisms. The underlying biological mechanisms are still poorly understood. Based on their review of a number of these epidemiological studies (as published after 1987 when the federal standards were revised), together with suggestion of PM2.5 concentrations as a more reliable surrogate for the health impacts

of the finer fraction of PM than PM10, the U.S. EPA concluded that the then-current standards were not sufficiently stringent to protect against significant effects in exposed humans. Therefore, federal PM standards were revised on July 18, 1997 (62 Fed. Reg. 38652) to add new annual and 24-hour PM2.5 standards to the existing annual and 24-hour PM10 standards. Taken together, these new standards were meant to provide additional protection against a wide range of PM-related health effects, including premature death, increased hospital admissions and emergency room visits, primarily among sensitive individuals such as the elderly, children and individuals with cardiopulmonary diseases such as asthma. Other impacts include decreased lung function (particularly in children and asthmatics), and alterations in lung tissue and structure.

California has also had 24-hour and annual standards for PM10 (CARB 1982, pp. 81, 84). These studies were aimed at establishing the PM10 levels capable of inducing asthma, premature death and bronchitis-related symptoms. They were set to protect against such impacts in the general population as well as sensitive individuals such as patients with respiratory disease, declines in pulmonary function, especially as related to children (Tit. 17, Cal. Code Regs. §70200). These standards were set to be more stringent than the federal standard, which the ARB regarded as inadequate for the protection desired (CARB 1991, p. 26).

On June 20, 2002, the ARB approved the adoption of a lower annual state standard for PM10, as well as a new annual standard for PM2.5 (CARB 2002). The new standards took effect on July 5, 2003. The 24-hour PM10 standard was not changed. The standards were established to prevent excess death, illnesses such as respiratory symptoms, bronchitis, asthma exacerbation, and cardiac disease, and restrictions in activity from short- and long-term exposures (Title 17, Cal. Code Regs. §70200).

NITROGEN DIOXIDE (NO_2)

Nitrogen dioxide is formed either directly or indirectly when oxygen and nitrogen in the air combine together during the combustion. It is a relatively insoluble gas, which can penetrate deep into the lungs, its principal site of toxicity. Its toxicity is thought to be due to its capacity to initiate free radical-mediated reactions while oxidizing cellular proteins and other biomolecules (CARB 1992, Appendix A, p. 4).

Sub lethal exposures in animals usually produce inflammations and varying degrees of tissue injury characteristic of oxidant damage (Evans in CARB 1992, Appendix A, and p 5). The changes produced by low-level acute or sub chronic exposures appear to be reversible when the animal study subject is allowed to recover in clean air.
Health effects of particular concern in relation to low-level nitrogen dioxide exposure include: (1) effects of acute exposure on some asthmatics and possibly on some persons with chronic bronchitis, (2) effects on respiratory tract defenses against infection, (3) effects on the immune system, (4) initiation or facilitation of the development of chronic lung disease, and (5) interaction with other pollutants (CARB 1992, Appendix A, p. 5).

Several groups, which may be especially susceptible to nitrogen dioxide-related health effects have been identified from human studies (CARB 1992, Appendix A, and p. 3).

These include asthmatics, persons with chronic bronchitis, infants and young children, cystic fibrosis and cancer patients, people with immune deficiencies, and the elderly. Studies involving brief, controlled exposures on sensitive individuals have shown an increase in bronchial reactivity or airway responsiveness of some asthmatics, as well as decreased lung function in some patients with chronic obstructive lung disease (CARB 1992, Appendix A, p. 2). In general, bronchial hyper reactivity (an increased tendency of the airways to constrict) is markedly greater in asthmatics than in non-asthmatics upon exposure to initiating respiratory irritants (CARB 1992a, p. 107). At exposure concentrations of specific relevance to the current one-hour ambient standard, there appears to be little, if any, effect on respiratory symptoms of asthmatics (CARB 1992a, p. 108).

SULFUR DIOXIDE (SO_2)

Sulfur dioxide is formed when any sulfur-containing fuel is burned. SO_2 is highly soluble and consequently absorbed in the moist passages of the upper respiratory system. Exposure to sulfur dioxide can lead to changes in lung cell structure and function that adversely affect a major lung defense mechanism known as mucociliary transport. This mechanism functions by trapping particles in mucus in the lung and sweeping them out via the cilia (fine hair-like structures) also in the lung. Slowed mucociliary transport is frequently associated with chronic bronchitis.

Exposure to sulfur dioxide can produce both short- and long-term health effects. Therefore, California has established sulfur dioxide standards to reflect both short- and long-term exposure concerns. Based on controlled exposure studies of human volunteers, investigators have found that asthmatics comprise the group most susceptible to adverse health effects from exposure to sulfur dioxide (CARB 1994, p. V-1).

The primary short-term effect is bronchoconstriction, a narrowing of the airways, which results in labored breathing, wheezing, and coughing. The short-term (one-hour) standard is based on bronchoconstriction and associated symptoms (such as wheezing and shortness of breath) in asthmatics and is designed to protect against adverse effects from five to ten minute exposures. In the opinion of the California Office of Environmental Health Hazard Assessment, the short-term ambient standard is likely to afford adequate protection to asthmatics engaged in short periods of vigorous activity (CARB 1994, Appendix A, p. 16).

Longer-term exposure is associated with increased incidence of respiratory symptoms (such as coughing and wheezing) or respiratory disease, decreases in pulmonary function, and an increased risk of premature mortality (CARB 1991a, p. 12). The long-term (24-hour) standard is based upon increased incidence of respiratory disease and premature mortality. The standard includes a margin of safety based on epidemiological studies, which have shown adverse respiratory effects at levels slightly above the standard. Some of the studies indicate a sulfur dioxide threshold for effects, suggesting that no significant effects are expected from exposures to concentrations at the state standard (Ibid.).

ATTACHMENT A - REFERENCES

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SOCIOECONOMICS

Jacob Hawkins M.E.S.M.

SUMMARY OF CONCLUSIONS

Energy Commission staff concludes that the nominal 177-megawatt (MW) solar thermal electric generation project, referred to as the Carrizo Energy Solar Farm (CESF or proposed project), would not result in significant adverse direct or indirect socioeconomics impacts. In addition, the CESF would not contribute to a cumulative socioeconomic impact on the area's population, employment, housing, police, schools, or hospitals because the construction and operation workforce required for the CESF largely resides in the regional or local labor market area. The construction and operation of the proposed CESF would not result in any disproportionate adverse socioeconomic impacts to any low-income or minority population. Gross public benefits from the proposed CESF include capital costs and sales taxes as well as the generation of secondary jobs and income.

INTRODUCTION

The California Energy Commission (Energy Commission) staff socioeconomics impact analysis evaluates project-related changes on existing population and employment patterns, community services, and provides demographic information related to Environmental Justice (EJ). A discussion of the estimated beneficial economic impacts of the construction and operation of the proposed CESF and other related economic impacts is provided. Information provided herein was obtained from the CESF Application for Certification (AFC) Section 5.10 (Socioeconomics) and independently reviewed by Energy Commission staff.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

SOCIOECONOMICS Table 1 contains socioeconomics laws, ordinances, regulations, and standards (LORS) applicable to the proposed CESF.

SOCIOECONOMICS Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Executive Order 12898	"Federal Actions to address Environmental Justice (EJ) 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 US Environmental Protection Agency (EPA) and all other federal agencies (as well as state agencies receiving federal funds) 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 and/or low-income populations.
EPA's 1998 “Final Guidance for Incorporating Environmental Justice Concerns”	Minority (people of color) and low-income populations are identified where either the minority or low-income population of the affected area is greater than 50 percent of the affected area’s general population; or the minority or low-income population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.
State	
California Government Code, Section 65040.12 (e)	Section 65040.12 (e) defines “environmental justice” to mean “fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.”
California Resources Agency Environmental Justice Policy	It is the policy of the Resources Agency that the fair treatment of people of all races, cultures and income shall be fully considered during the planning, decision making, development and implementation of all Resources Agency programs, policies and activities. The intent of this policy is to ensure that the public, including minority and low-income populations, are informed of opportunities to participate in the development and implementation of all Resources Agency programs, policies and activities, and that they are not discriminated against, treated unfairly, or caused to experience disproportionately high and adverse human health or environmental effects from environmental decisions.
California Education Code, Section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
Local	
San Luis Obispo County General Plan Economic Element Policy 2a	In evaluating proposed projects, consideration of potential economic benefits should be in balance with environmental and social considerations.
18.03.020 – Public Facility Fees	The imposition of Public Facility Fees may be a condition of permits for, or the approval of, new development projects in the county.

SETTING

PROJECT STUDY AREA

The proposed Carrizo Energy Solar Farm (CESF) would be located in an unincorporated area of San Luis Obispo County adjacent to Carrisa Highway/SR58 near the towns of Simmler and California Valley. The proposed project site is 640 acres with an additional 380-acre construction laydown site located to the south on adjacent property. The CESF would be owned and operated by Ausra CA II, LLC (dba Carrizo Energy, LLC). Research shows that workers may commute as much as two hours each direction from their communities rather than relocate (EPRI 1982). Therefore, for purposes of this analysis, the socioeconomics study area is the Counties of San Luis Obispo and Kern. The project area pertaining to regional workforce for the proposed project consists of San Luis Obispo and Kern Counties.

POPULATION CHARACTERISTICS

In order to characterize the population profile of the study area, current and forecasted population trends for the study area are summarized in **SOCIOECONOMICS Table 2**. As shown in **Table 2**, between the period of 2004 and 2025, Shandon is expected to experience the highest total population increase, while the rural Shandon-Carrizo area is expected to experience the lowest population increase within the CESF study area.

SOCIOECONOMICS Table 2
Population Profile of the Study Area, Year 2000–2030

	Year		
Area	**2004 Population**	**2025 Projected Population**	**Projected 20-Year Population Growth**
Shandon	984	8,445	7,461 (758%)
Shandon-Carrizo (rural)	1,441	1,679	238 (17%)
Shandon-Carrizo (total)	2,425	10,124	7,699 (417%)
San Luis Obispo County	258,208	334,775	76,567 (30%)
Kern County	729,521*	1,046,056	316,535 (43%)

Source: CESF 2007a, Kern County 2002.

DEMOGRAPHIC SCREENING

The purpose of the demographic screening is to determine whether low-income and/or minority populations exist within the potential affected area of the proposed CESF site. Staff conducted the screening analysis according to the "Final Guidance for Incorporating Environmental Justice Concerns in EPA's National Environmental Planning Act (NEPA) Compliance Analysis," (US EPA 1998), and has determined the potential affected area to be a six-mile radius of the proposed CESF site. The six-mile radius is consistent with the radius used to determine potential air quality impacts within the **Air Quality** section of the Staff Assessment.

In 1997, the President's Council on Environmental Quality issued Environmental Justice guidance defining *minority* as individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. Minority population concentrations, as defined by this guidance document, are identified where:

- the minority population of the affected area is greater than 50 percent of the affected area's general population; or
- the minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis; or
- one or more census units in the affected area have a minority population greater than 50 percent.

SOCIOECONOMICS Figure 1 presents a graphic depiction of the Year 2000 minority population within the six-mile radius of the proposed CESF site. As shown in **Figure 1,** the total population of census blocks within a six-mile radius of the CESF site is 246 persons with a total minority population of 51 persons (or 20.7 percent of the total six-mile radius population).

Low-income populations are identified with the annual statistical poverty thresholds from the U.S. Census Bureau's most recently published population reports presenting low-income data by the census block group (which are made up of a cluster of census blocks, and thus a larger geographic area) geographic range (US Census 2000). Poverty status excludes institutionalized people, people in military quarters, people in college dormitories, and unrelated individuals under 15 years old. The total population of census block groups within a six-mile radius of the CESF site (for which poverty status was determined by the US Census) is 693 persons with a total low-income population of 124 persons (or 17.9 percent of the total six-mile radius population for which poverty status was determined).

Demographic Screening Summary

While **SOCIOECONOMICS Figure 1** (located at the end of this analysis) shows that there are two census blocks that include minority populations greater than 50 percent, this figure also indicates that the census blocks within a six-mile radius of the CESF site include a total minority population of less than 50 percent. Based on income data

compiled by the US Census, the low-income population within the CESF study area is less than 50 percent.

EMPLOYMENT CHARACTERISTICS

The study area includes Kern and San Luis Obispo Counties. **SOCIOECONOMICS Table 3** presents Year 2008 labor force characteristics for the study area. As shown in **Table 3**, the study area is diverse in industry employment, with Kern County having the largest employment sector. While government accounts for the largest proportion of employment, among all private industries within the study area, the trade, transportation, and utilities industry has the largest employment numbers.

SOCIOECONOMICS Table 3
Study Area 2008 Labor Force Characteristics

Industry	Kern County Labor Force Characteristics	San Luis Obispo County Labor Force Characteristics
Total Farm	47,800	5,000
Construction	17,700	7,500*
Education and Health Services	24,600	11,600
Financial Activities	8,900	4,500
Government	62,700	24,500
Information	2,800	1,400
Leisure and Hospitality	21,400	15,500
Manufacturing	14,000	5,700
Natural Resources and Mining	10,600	(included with construction)
Professional and Business Services	26,800	9,700
Trade, Transportation, and Utilities	47,000	20,600
Other Services	7,300	4,400
Total Employed	*291,600*	*110,400*
Unemployment Rate	8.1%	4.7%

* San Luis Obispo County employment statistics aggregate construction employment with natural resources and mining employment.
Source: CAEDD 2008a, CAEDD 2008b.

HOUSING

Year 2008 housing conditions within the study area are shown in **SOCIOECONOMICS Table 4.** As shown in **Table 4**, there were 392,773 total housing units in the study area in 2008, with 37,981 of these units being vacant, creating an average vacancy rate of 9.67 percent for the study area. Additionally, San Luis Obispo County has approximately 8,700 hotel rooms with a vacancy rate of 27.4 percent (CESF 2007a).

SOCIOECONOMICS Table 4
Housing Units in the Study Area, Year 2008

	Total Units	Single-Family	Multi-Family	Mobile Homes	Percent Vacant
Kern County	276,602	202,246	48165	26,191	9.84
San Luis Obispo County	116,171	83,229	20,822	12,120	9.28
Total	392,773	285,475	68,987	38,311	9.67

Source: CDOF, 2008.

FISCAL REVENUE

The applicant expects the CESF to be allowed a 100 percent Property Tax Exemption as part of the California Incentives for Renewables and Efficiency. Therefore, the CESF would not contribute to County and local property tax revenues (CESF 2007a).

PUBLIC SERVICES

Physical impacts to public services and facilities are usually associated with population in-migration and growth in an area, which increase the demand for a particular service, leading to the need for expanded or new facilities. Service providers serving the CESF site are located within San Luis Obispo County. Therefore, the study area for the public services analysis is limited to San Luis Obispo County.

Police Protection

The proposed CESF site is located within the San Luis Obispo County Sheriff's (SLOCS) jurisdiction. The SLOCS's Department is located at 1585 Kansas Avenue, San Luis Obispo, CA. There are approximately 159 sworn personnel within the SLOCS's Department. The SLOCS provides service to the unincorporated areas of San Luis Obispo County (CESF 2007a). Rob Bryn, Crime Prevention Specialist with the SLOCS, stated that average response times to the project site would be approximately 35 to 40 minutes (Bryn, 2008).

The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. The CHP division covering highways within the project area is the Coastal Division at 675 California Boulevard, San Luis Obispo, CA. The CHP Coastal Division has 530 uniformed officers (CESF 2007a).

Schools

There are four unified school districts within the project area, Paso Robles Unified School District, Shandon Unified School District, Atascadero Unified School District, and New Cuyama School District. The CESF site is in the Atascadero Unified School District. Within the Atascadero Unified School District, the Carrisa Plains School is located less than a mile from the project site. There are approximately 31 students enrolled at Carrisa Plains School (K-8th grade) (CESF 2007a).

Hospitals

There are three hospitals that are located within 60 miles of the project site. Twin Cities Hospital, with 84 beds, is approximately 56 miles from the project site. Twin Cities Hospital has a 24-hour emergency department and is the priority hospital for ambulance and air transport. This hospital is located at 1100 Las Tablas Road, in Templeton.

French Hospital Medical Center, with 112 beds, is approximately 57 miles from the projects site. French Hospital Medical Center has an ICU department, 24-hour emergency department and a heli-pad for air transport. French Hospital Medical Center is located at 1911 Johnson Avenue in San Luis Obispo.

Sierra Vista Regional Medical Center is approximately 57 miles from the project site and has 165 beds. Sierra Vista Regional Medical Center has a 24-hour emergency room as well as an ICU department. This hospital is located at 1010 Murray Avenue in San Luis Obispo (CESF 2007a).

ASSESSMENT OF IMPACTS

Staff reviewed the socioeconomic section of the CESF AFC and the socioeconomic data provided and referenced from various governmental agencies and trade associations, and conducted its own independent analysis to form the following socioeconomics analysis and conclusions.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

According to Appendix G of the California Environmental Quality Act (CEQA) Guidelines, a project may have a significant effect on population, housing and public services if the project will:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for fire and police protection, schools, parks and recreation, and other public facilities

A socioeconomic analysis looks at beneficial impacts on local finances from property and sales taxes as well as potential adverse impacts on public services. In order to determine if a project would have any significant impacts, staff analyzes whether the current status of community services and capacities can absorb the project related impacts in each of these areas. If the project's impacts could appreciably strain or degrade these services, staff considers this to be a significant adverse impact and would propose mitigation. A project's property taxes, sales tax or local school impact fees or development fees can help local governments to augment public services as needed. The analysis of subject areas such as capacities of fire service providers, utilities, water use, and wastewater disposal are identified in the **Worker Safety and Fire Protection**, **Soil and Water Resources**, and **Waste Management** sections, respectively, of the Staff Assessment.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Population and Employment

As stated in AFC Section 3.0 (Project Description), it is anticipated that construction of the proposed CESF would last for 35 months. Required construction personnel would consist of craftspeople and supervisory, support, and construction management workers on-site during construction. There would be an average of approximately 290 daily construction workers, with a peak daily workforce of 446 during month 17 of construction, depending on the month and the work required, according to the AFC Section 5.10 (Socioeconomics). This peak employment number is used to analyze worst-case construction population and employment impacts.

The Impact Analysis for Planning (IMPLAN) model (an input-output model), used by the applicant to estimate employment and income impacts from the CESF on the study area is acceptable to staff. The University of California at Berkeley uses the IMPLAN model for regional economic assessment, and it has been used to assess other generating projects in California and the U.S. IMPLAN is a disaggregated type of model that divides the (regional) economy into sectors and provides a multiplier for each sector (Lewis et al. 1979). Social Accounting Matrix (SAM)[1] multipliers were used for the applicant's economic impact analysis. SAM multipliers are similar to Type II[2] multipliers because they both include the indirect and induced effects (secondary impacts). IMPLAN multipliers were used to calculate direct, indirect, and induced jobs and expenditures in the regional economy.

The IMPLAN runs estimate total construction employment at 694 total jobs (404 secondary jobs) based on an average of 290 project-related construction jobs. The CESF annual local construction expenditures of $3.4 million and annual construction payroll of $58.3 million would result in an estimated $14.5 million in secondary labor income for a positive or beneficial total impact of approximately $76.2 million. As reported by the applicant, the CESF's construction employment multiplier is approximately 2.4 and the construction income multiplier is approximately 1.2.

For CESF operations, 77 direct operations jobs and 33 jobs as secondary impacts yield an estimated total of 110 jobs. $4.4 million in annual operations expenditures yield a positive or beneficial secondary impact of approximately $1.3 million and a total income impact of approximately $5.7 million (CESF 2007b). As reported by the applicant, the CESF's operation employment multiplier is approximately 1.4 and the income multiplier is approximately 1.3.
Staff finds the economic impact analysis reasonably consistent with the economic literature cited by many economists (Moss et al. 1994 and Mulkey et al. 2000) and therefore finds these projected beneficial economic impacts close enough to the benchmarks to be considered reasonable.

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[1] Type SAM multipliers capture inter-institutional transfers and account for social security and income tax leakages, institutional savings, and commuting and Type II multiplier effects (direct, indirect, and induced).

[2] A Type I multiplier is the ratio of the direct plus indirect change to the direct change resulting from a unit increase in final demand for any given sector. A Type II multiplier is the ratio of the direct, indirect, and induced change to the direct change resulting from a unit increase in final demand. The Type II multiplier takes into account the CESF repercussionary effects of secondary rounds of consumer spending in addition to the direct and indirect inter-industry effects (Richardson 1972). Both multipliers can be of an income or employment type. Indirect changes are production changes in industries supplying the original industry (backward linkages). Induced changes are changes in regional household spending levels caused by regional employment impacts.

It is anticipated that construction workers would commute as much as two hours each direction from their communities rather than relocate (EPRI 1982). Staff reviewed the socioeconomics data for counties within the two-hour commute range, which is within the study area and includes Kern and San Luis Obispo Counties. **SOCIOECONOMICS Table 3** indicates that approximately 25,200 construction workers are available within the study area. The peak 446 daily construction workers represent less than 1 percent of the total construction workforce from within the Kern and San Luis Obispo Counties study area. The construction labor needed would not substantially impact the study area's workforce.

The applicant has stated that approximately 50 percent of the construction workforce would come from within a two-hour commute which would include the Shandon-Carrizo planning area first, then San Luis Obispo County and then Kern County/Bakersfield. For construction of the facility, approximately 223 construction workers (about 50 percent) of the maximum 446 construction workers would be drawn from within the two-hour commute area. This indicates that approximately 223 construction workers would be drawn from outside the two-hour commute area and would temporarily relocate to San Luis Obispo and Kern Counties.

The influx of 223 construction workers to the Shandon-Carrizo area, as shown above in **SOCIOECONOMICS Table 2,** would represent an increase of 9 percent to the population in the immediate area surrounding the CESF site. Due to the sparse housing options in the Shandon-Carrizo area, it is anticipated that these additional, temporary construction workers would be housed in San Luis Obispo, Bakersfield, and other regional centers. According to AFC Section 5.10 (Socioeconomics), buses would be provided to transport workers to and from regional centers to the CESF site. The influx of an additional 223 workers to the overall study area would represent an approximate 0.02 percent increase in population. Therefore, no significant impacts would occur to existing population levels or employment distribution within the study area from construction of the proposed CESF.

According to AFC Section 5.10 (Socioeconomics), the proposed CESF is expected to require a total of 75 permanent full-time employees and an estimated equivalent employment of 2 contract employees for operations. Research shows that operational workers would commute as much as one hour to a power plant site from their homes rather than relocate (EPRI 1982). This one-hour commute range includes San Luis Obispo, Paso Robles, and Bakersfield. As shown in **SOCIOECONOMICS Table 3**, due to the large labor force located within the study area, it is assumed that the new employees required for the CESF would be found locally. As all workers are expected to reside within the study area, no impacts to existing population levels would occur. Because the number of operational workers required represents such a small portion of the local available labor force, no significant impacts to the study area population or employment base would result from proposed project operation.

Housing

The proposed CESF site is on land zoned for agricultural use. While farm structures exist on the property, they have been abandoned and are not used for housing. As

such, no housing would be displaced. As presented in **Socioeconomics Table 4**, there were 392,773 total housing units within the study area, with 37,981 vacant units, resulting in a 9.67 percent vacancy rate, and a hotel vacancy rate in San Luis Obispo County of 27.4 percent, resulting in approximately 2,384 available rooms. As discussed above, 50 percent of the workers would be drawn from the existing workforce within commuting distance of the proposed CESF site, and 50 percent would be temporarily drawn from outside the study area, but would be housed in regional centers across the study area. The 223 temporary workers would occupy approximately 8 percent of the vacant hotel rooms in San Luis Obispo County and 0.6 percent of vacant housing units. As discussed above, CESF operation would require 77 employees that are expected to come from within the study area. In the unlikely event that any workers come from outside the study area, ample vacant housing is available. Therefore, no construction or operation-related significant impacts are expected on the local housing supply availability or demand.

Fiscal and Economic Effects

Property Taxes

As described above, the applicant expects the CESF to be allowed a 100 percent Property Tax Exemption as part of the California Incentives for Renewables and Efficiency and so would not contribute to County and local property tax revenues. Therefore, there would be no impacts to the property tax base of San Luis Obispo County as a result of the CESF.

Sales Tax

The estimated total construction cost of the CESF is approximately $500 million with approximately $55 million going towards wages and salaries of the Applicant (CESF 2007a) and approximately $170 million in payroll for the Applicant's outside construction contractor(s) and associated craftsworkers. With local construction workers comprising approximately 50 percent of the labor workforce, approximately $85 million would be paid to local construction workers. The Applicant anticipates that approximately 20 percent of the total construction costs would be used to purchase local materials. Along with local workers using a portion of their earnings in the local economy, the Applicant estimates that construction would generate approximately $775,000 in sales tax revenues.

Public Services

Physical impacts to public services and facilities are usually associated with population in-migration and growth in an area, which increase the demand for a particular service and lead to the need for expanded or new facilities. An increase in population in any given area may result in the need to develop new or alter existing public services and associated facilities to accommodate increased demand. The **Socioeconomics** analysis focuses on the proposed project impacts to public services such as law enforcement, schools, and hospitals. The analysis of proposed project impacts to fire protection service levels is discussed within the **Worker Safety and Fire Protection** section of the Staff Assessment.

Law Enforcement

Approximately half of the required construction labor force and all of operational labor force would reside within the two-county study area. While the 223 maximum temporary workers would increase the total population between San Luis Obispo and Kern Counties, as this represents an approximate 0.02 percent increase in the population of these counties, there would be no need for an increase in law enforcement services or facilities in the study area. As described in AFC Section 5.10 (Socioeconomics), response time can be delayed due to distance (CESF 2007a). Additionally, the 77 personnel required for operation of the project would be drawn from the existing population in the study area and would not increase the local population. Therefore, construction and operation activities at the proposed CESF would not significantly impact the existing service levels or response times of the SLOCS and CHP serving the CESF site or surrounding area.

Schools

As discussed earlier in the population and employment analysis, the 223 construction workers who would temporarily relocate for construction of the proposed CESF would represent an approximately 0.02 percent increase in the population of the study area. Operation of the proposed CESF is expected to employ a total of 77 full-time employees who are expected to maintain their existing residences within the study area labor force. Consequently, the proposed CESF would not result in any direct population growth to the area that could generate a need for expanded school facilities. No impacts to schools would occur.

Education Code section 17620 authorizes a school district to levy a fee against any construction within a district. State and local agencies are precluded from imposing additional fees or required payments on development projects for the purpose of mitigating possible enrollment impacts to schools. Local commercial school impact fees for the Atascadero Unified School District are currently $0.43 per square foot of occupied space (CESF 2007b). Staff has proposed Condition of Certification **SOCIO-1** to ensure payment of a one-time school impact fee and compliance with LORS.

There are no significant adverse socioeconomic impacts on educational resources from the facility.

Parks and Recreation

Approximately 223 construction workers for this project would be drawn from outside the study area, representing a 0.02 percent increase in the population of the study area. As this construction labor force would be relocating temporarily for only a short period, it is unlikely to bring dependents. Overall, short-term construction labor requirements for the CESF (an estimated 446 peak workers) and a small operational workforce of 77 drawn from the study area labor force, should not have a significant adverse socioeconomic impact on parks and recreation.

Hospitals

The proposed CESF would not directly or indirectly induce substantial population growth in the area. The proposed CESF site is served by several hospitals equipped to provide

24-hour emergency rooms (CESF 2007a). No additional constraints or physical impacts would occur to the healthcare services or facilities provided by the hospitals serving the CESF site. Staff concludes that the medical services are adequate for the CESF's construction and operation. For additional discussion see the **Worker Safety** section of this document. Therefore, construction and operation of the proposed CESF would have no impacts to hospital facilities.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in significant adverse cumulative impacts when 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, or the effects of probable future projects (Title 14, California Code of Regulations, section 15130). Cumulative socioeconomics impacts could occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by the local labor force, resulting in an influx of non-local workers and their dependents.

In addition to the CESF, the applicant identified 41 projects with permits or permit applications within a five mile radius (entirely located within San Luis Obispo County) of the project area (CESF 2007a). There are no major residential or commercial projects within a five-mile radius of the CESF. However, there are six new residential construction projects (i.e., single-family dwellings) proposed and 35 minor construction projects (i.e. mobile home permits) (CESF 2007a). Additionally, Topaz Solar Farms, LLC (Topaz) has proposed to construct and operate a 550 MW solar photovoltaic (PV) energy facility on 6,200 acres immediately northwest of the proposed CESF and the SunPower California Valley Solar Ranch, a 250 MW solar PV energy facility, is proposed southwest of the proposed CESF site. The proposed Topaz project would require a workforce of 250 personnel over the course of its 3-year construction period and would have an operational workforce of an average of 10 workers. The construction and operational workforces of the SunPower California Valley Solar Ranch are not known at this time.

As discussed above, an assumed maximum need of 223 local construction workers represents less than 1 percent of the total construction workforce within the study area. Another approximately 223 construction workers would temporarily relocate to work on the proposed CESF. Combined with the construction of the Topaz project, the cumulative personnel requirement would average approximately 540 workers if construction were to occur concurrently. While it is unknown at this time what the peak number of workers for the Topaz and SunPower projects would be, if they are similar in scale to the proposed CESF, this would be approximately 768 workers. For the purposes of this analysis, it is assumed that all the workers would be drawn from the study area. This would result in these projects using approximately 3.9 percent of the construction workforce in the study area. Operation of the proposed CESF would require approximately 77 full-time, permanent employees drawn from the local workforce, while operation of the Topaz project would require approximately 10 employees from the local labor market. Therefore, because the proposed CESF requires such a small amount of the local labor force for both construction and operation, its cumulative contribution to socioeconomic impacts resulting from an influx

of non-local workers and their dependents would not be cumulatively considerable and, therefore would be less than significant.

Despite the potential for construction schedule overlaps with known projects within the proposed CESF study area, no adverse cumulative socioeconomic effects are anticipated from either the construction or operation of the proposed CESF. In addition, both the short-term construction-related and long-term operation-related spending activities of the CESF are expected to have cumulative economic benefits to the study area. The cumulative benefits would increase when revenues accrued as a result of the proposed CESF are combined with spending and any local revenues accrued as a result of current and future reasonably foreseeable cumulative development projects.

NOTEWORTHY PUBLIC BENEFITS

Important public benefits discussed earlier under the fiscal and economic effects section, include both the short-term construction related and long-term operational related increase in local expenditures and payrolls, as well as sales tax revenues.

CONCLUSIONS

No significant adverse socioeconomics impacts would occur as result of the construction or operation of the proposed CESF. Staff believes the proposed CESF would not cause a significant adverse direct, indirect, or cumulative impact on population, employment, housing, public finance, local economies, or public services. In addition, because there would be no adverse project-related socioeconomic impacts, minority and low-income populations would not be disproportionately impacted. The proposed CESF would benefit the study area in terms of an increase in local expenditures and payrolls during construction and operation of the facility. These activities would have a positive effect on the local and regional economy.

Estimated gross public benefits from the CESF include increases in sales taxes and employment for San Luis Obispo County. For example, there are an average estimated 290 direct project-related construction jobs per day for the 35 months of construction. The facility construction payroll is an estimated $170 million for 35 months, and the operation payroll is expected to be $4.3 million annually (CESF 2007a).

Finally, the following **Socioeconomic Table 5** provides a summary of socioeconomic data and information from this analysis, with emphasis on economic benefits of the CESF.

Socioeconomic Table 5
Data and Information

Estimated Project Capital Cost	$500 million
Estimate of Locally Purchased Materials	
Construction	$10 million
Operation (Operation & Maintenance)	$2.0 million per year
Estimated Annual Property Taxes	$0
Estimated School Impact Fees	$27,520
Estimated Direct Employment	
Construction (average)	290 average jobs per month (total of)
Operation	77 persons
Estimated Direct Payroll	
Construction	$170 million (estimated)
Operation	$4.3 million annually (estimated)
Estimated Total Sales Taxes (Total: Combined State, County and local)	
Construction	$775,000
Operation	$155,000
Existing Unemployment Rates	4.7% (San Luis Obispo County) 8.1% (Kern County)
Percent Minority Population (6 mile radius)	20.7%
Percent Poverty Population (6 mile radius)	17.9%

PROPOSED CONDITIONS OF CERTIFICATION

SOCIO-1 The project owner shall submit the applicable State-mandated school impact fees to the Atascadero Unified School District at the time of building permit issuance.

Verification: At least 30 days prior to start of project construction, the project owner shall provide the Compliance Project Manager (CPM) proof of payment of the statutory development fee.

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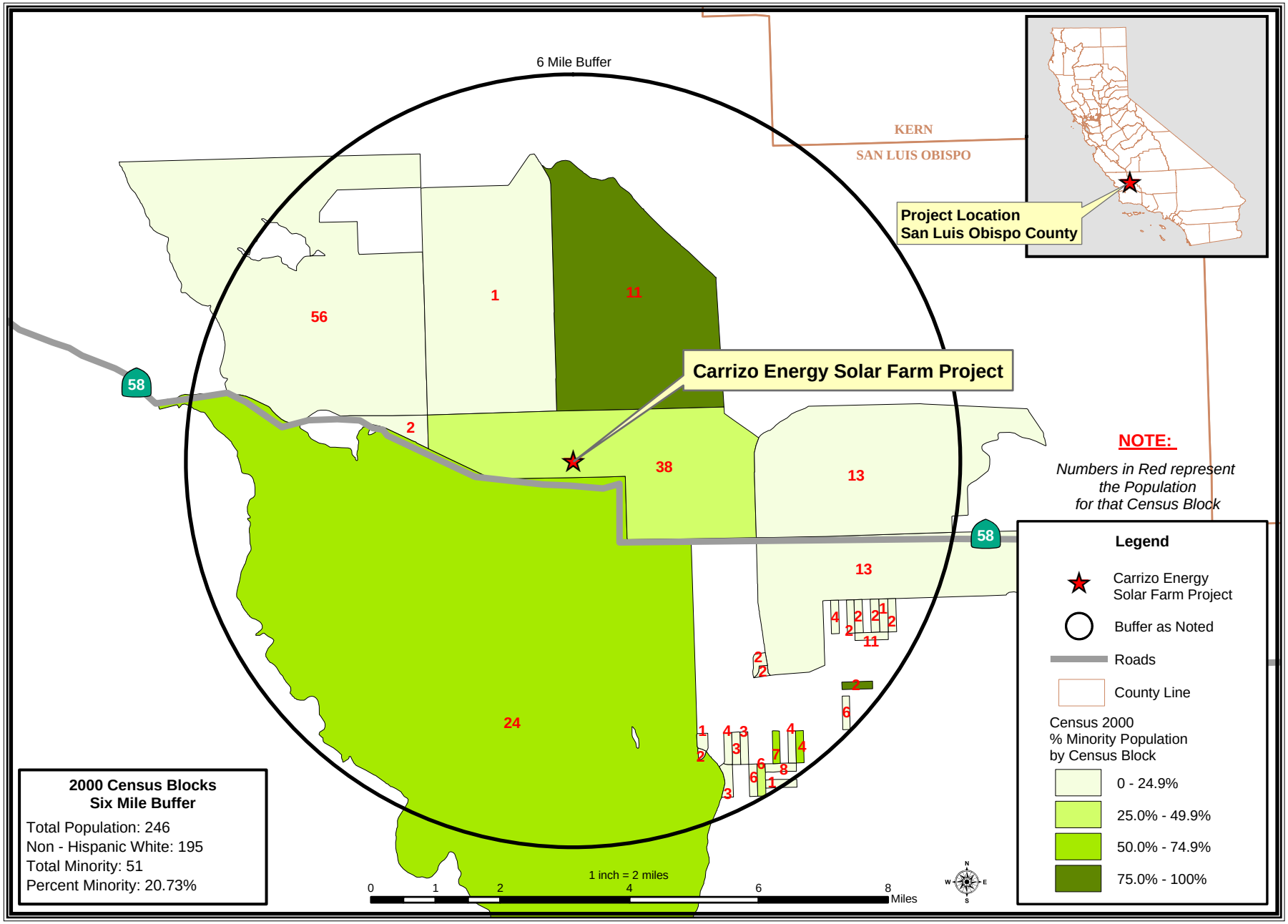
SOCIOECONOMICS - FIGURE 1

Carrizo Energy Solar Farm Project - Census 2000 Minority Population by Census Block - Six Mile Buffer



NOVEMBER 2008

SOCIOECONOMICS

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: California Energy Commission Statewide Power Plant Maps 2008 - Census 2000 PL 94-171 Data - Matrix PL2

SOIL AND WATER RESOURCES

Mark Lindley, P.E.

SUMMARY OF CONCLUSIONS

Staff has not identified any immitigable potentially significant impacts to Soil and Water Resources for the Carrizo Energy Solar Farm (CESF) and believes the project will comply with all applicable laws, ordinances, regulations and standards (LORS) provided the proposed conditions of certification are implemented.

However, staff has identified several issues that could lead to potentially significant impacts that must be addressed prior to the Final Staff Assessment and licensing, including:

- Two proposed crossings of Carriza Creek may increase flooding upstream of the crossings. The applicant should re-examine the need for these crossings to determine if the project can be successfully constructed without placing fill in an existing stream channel. The crossing designs need to be updated to ensure that upstream flood elevations are not increased as compared to existing conditions.
- Staff believes that it would be preferable to locate the construction fueling area outside of the existing 100-year FEMA floodplain. Relocating the fueling area to the north and east of Carriza Creek could eliminate the need for the two creek crossings and the placement of fill in the creek channel.
- Water supply for construction appears to be significantly under-estimated. The applicant should provide clear documentation demonstrating that all construction requirements (including dust suppression) can be successfully accomplished with the estimated (20.8 acre-feet per year) water supply.
- The applicant indicates that the proposed perimeter swales will capture and detain the first 117 acre-feet of runoff from two up-gradient watersheds. On the Carrizo Plain, with extremely limited water resources, capturing and detaining up-gradient runoff could result in potentially significant impacts to down-gradient surface water resources including Carriza Creek and Soda Lake and groundwater users. The applicant should include provisions for this runoff to pass through the CESF project site.
- Potable water supply estimates are 5.3 gpm for average annual (averaged over 8,760 hours) and maximum daily usage. The applicant should confirm the average annual and maximum daily potable water supply estimates.
- The proposed sanitary waste water system includes a 1,000-gallon septic tank and leach field. However, the septic tank appears to be undersized given the number of employees and the applicant's estimate of potable water supply. The applicant should provide clear documentation demonstrating that the septic system has been designed in accordance with San Luis Obispo County and California Plumbing Code standards.
- Infiltration BMPs should be added to the detention/infiltration areas to limit the potential for extended shallow ponding to increase mosquito production.

- Post construction BMPs should be identified to stabilize soils in the laydown area and at the Solar Field.

Staff concludes the following:

- Implementation of Best Management Practices during CESF construction in accordance with effective Storm Water Pollution Prevention Plans and a Drainage, Erosion and Sedimentation Control Plan would avoid significant adverse effects that could otherwise result in significant transport of sediments or contaminants from the site by wind or water erosion.
- The proposed use of groundwater for the project's process and potable water needs would not cause a significant adverse environmental impact or affect current or future users of groundwater.
- Groundwater from the Lower Aquifer water is the most degraded quality water supply reasonably available to the project and staff considers its use by the project consistent with state water use and conservation policies.
- The project would not be located within the 100-year flood plain, and would not exacerbate flood conditions downstream of the project site of the project. (Please see above for potential flooding impacts upstream of the project site related to the proposed Carriza Creek crossings.)
- The proposed recovery of process wastewater using Zero-Liquid-Discharge technology is consistent with state water use and conservation policies.

Where the potential for impacts has been identified, staff has proposed mitigation measures to reduce the impact to less than significant. The mitigation measures, as well as specifications for LORS conformance, are included as conditions of certification.

INTRODUCTION

This section analyzes potential impacts to soil and water resources from the construction and/or operation of the Carrizo Energy Solar Farm. The analysis specifically focuses on the potential for the project to cause impacts in the following areas:

- Whether the project's use of groundwater would cause a significant, or potentially significant, adverse change in the quantity or quality of groundwater or surface water.
- Whether project construction or operation will lead to degradation of surface or groundwater quality.
- Whether construction or operation will lead to accelerated wind or water erosion and sedimentation.
- Whether the project will exacerbate flood conditions in the vicinity of the project.
- Whether the project will comply with all applicable laws, ordinances, regulations and standards.

Where the potential for impacts are identified, staff has proposed mitigation measures to reduce the significance of the impact and, as appropriate, has recommended conditions of certification.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Federal, State, and Local LORS that apply to CESF related to soil and water resources are summarized below in **Soil and Water Table 2**. Staff has reviewed the project as proposed by the applicant to determine if the proposed project will meet the requirements set forth in the Federal, State, and Local LORS.

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

Federal LORS	
Clean Water Act (33 U.S.C. Section 1251 et seq.)	The Clean Water Act (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of stormwater and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the Clean Water Act under the Porter-Cologne Water Quality Control Act of 1967.
Resource Conservation and Recovery Act	The Resource Conservation Recovery Act (RCRA) of 1976 (40 CFR Part 260 et seq.) seeks to prevent surface and groundwater contamination, sets guidelines for determining hazardous wastes, and identifies proper methods for handling and disposing of those wastes.
State LORS	
California Water Code Section 13260	Requires filing with the appropriate Regional Water Quality Control Board (RWQCB) a report of waste discharge that could affect the water quality of the state, unless the requirement is waived pursuant to Water Code section 13269.
California Code of Regulations, Title 17	Title 17, Division 1, Chapter 5, addresses the requirements for backflow prevention and cross connections of potable and non-potable water lines.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15, requires the California Department of Public Health (DPH) to review and approve the wastewater treatment systems to ensure they meet tertiary treatment standards allowing use of recycled water for industrial processes such as steam production and cooling water. DPH also specifies Secondary Drinking Water Standards in terms of Consumer Acceptance Contaminant Levels, including TDS ranging from a recommended level of 500 mg/l, an upper level of 1,000 mg/l and a short term level of 1,500 mg/l.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15, requires the RWQCB to issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
CWC Section 13751	Requires that a Report of Well Completion to be filed with the Department of Water Resources within 60 days of well completion.
The California Safe Drinking Water and Toxic Enforcement Act	This Act (California Health & Safety Code Section 25249.5 et seq.) prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the Act.

California Constitution, Article X, Section 2	This section requires that the water resources of the State be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	Requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
Local LORS	
San Luis Obispo County Ordinance Code, Title 15: Chapter 15,28	San Luis Obispo County requires that the Project obtain a Grading Permit that establishes grading and excavation requirements during construction of the Project.
San Luis Obispo County Code, Title 19, Building and Construction Ordinance	San Luis Obispo County requires building and construction projects adhere to requirements related to site grading (Section 19.20.040), erosion control (Section 19.20.090), and sewage disposal (Section 19.20.220).
San Luis Obispo County Ordinance Code, Title 22, Land Use Ordinance	San Luis Obispo County requires approval of a drainage plan for portions of the project that are located within an existing flood hazard zone.
State Policies and Guidance	
State Water Resources Control Board (SWRCB) Res. 77-1	State Water Resources Control Board Resolution 77-1 encourages and promotes recycled water use for non-potable purposes.
SWRCB Resolutions 75-58 and 88-63	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. Resolution 75-58 defines brackish waters as “all waters with a salinity range of 1,000 to 30,000 mg/l” and fresh inland waters as those “which are suitable for use as a source of domestic, municipal, or agricultural water supply and which provide habitat for fish and wildlife”. In a May 23, 2002 letter from the Chairman of the SWRCB to Energy Commission Commissioners, the principal of the policy was confirmed ‘that the lowest quality cooling water reasonably available from both a technical and economic standpoint should be utilized as the source water for any evaporative cooling process utilized at these facilities’. Resolution 88-63 defines suitability of sources of drinking water. The total dissolved solids must exceed 3,000 mg/L for it not to be considered suitable, or potentially suitable, for municipal or domestic water supply.
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq)	In the 2003 IEPR, consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be “environmentally undesirable” or “economically unsound.” Additionally, the Energy Commission will require zero liquid discharge technologies unless such technologies are shown to be “environmentally undesirable” or “economically unsound”.

REGIONAL SETTING

REGIONAL WATER RESOURCES

The proposed Carrizo Energy Solar Farm (CESF) will be located on the Carrizo Plain in an unincorporated area of eastern San Luis Obispo County. The project site is located on California State Route 58 (SR-58), approximately 36 miles east of San Luis Obispo, west of the town of Simmler and northwest of California Valley.

The Carrizo Plain watershed is located within Central Coast Hydrologic region that encompasses about 11,300 square miles within Central California. The Carrizo Plain watershed covers an area of approximately 414 square miles (263,680 acres) bounded by coastal mountains (Figure 2-1, CESF, 2008k). The Carrizo Plain is an alluvial valley with relatively flat topography surrounded by rolling hills. The valley is approximately 56 miles long by 6 miles wide with the valley floor about 2,200 feet above mean sea level. East of the valley, the Temblor Range rises to elevations of about 3,000 feet, and the Caliente-San Juan Range rises to elevations 2,500 and 4,000 feet along the west side of the valley. The San Andreas Fault, running along the Temblor Range about 4 miles from the project site is a predominant feature in the region.

Runoff from the surrounding coastal mountains and hills flows in ephemeral drainage channels to Soda Lake. Soda Lake, within the Carriza Plain National Monument, is approximately 10 miles downstream (southeast) of the project site. Soda Lake is a terminal lake (it does not have an outlet) and typically dries out annually except during years of unusually high precipitation. Soda Lake is an alkali lake: without an outlet, the inflow is lost to evaporation, leaving behind concentrated salts and minerals.

The natural water resources of the Carrizo Plain are extremely limited. Rainfall is the primary natural source of both surface water flows to Soda Lake and groundwater recharge for the region. However, the drainage channels within the Carrizo Plain are usually dry and flows are unpredictable and unreliable. While there are some small farm ponds on the Carrizo Plain, groundwater serves as the primary water supply for the region.

Agricultural development on the Carrizo Plain began prior to the 20th century and many ranches utilized groundwater to support irrigated agriculture throughout the 20th century. Currently, agricultural land uses are primarily centered around grazing and dry farming of wheat and barley. Irrigation wells are typically pumped for a few months to support cultivation of spring hay (CESF, 2008k). Local residents indicate that pumping for irrigation has decreased substantially over the past 40 years (CESF, 2008k).

Groundwater on the Carrizo Plain is utilized for domestic water supply, livestock, and limited irrigation. With the development of groundwater, it is estimated that regional water use may exceed the estimated natural recharge. The Department of Water Resources (DWR) and San Luis Obispo County Master Plan Update determined that the Carrizo Plain groundwater basin is in an overdraft situation (DWR, 2004 & SLO, 2003). However, monitoring data from the DWR and Regional Water Quality Control Board (RWQCB) indicates that water levels tend to fluctuate in response to rainfall patterns and do not show the steady decline characteristic of overdraft conditions

(CESF, 2007a). The DWR indicates that the Carrizo Plain groundwater basin is not subject to adjudication, and permits are not required to utilize groundwater on the Carrizo Plain.

Climate

While the Carrizo Plain is located within the Coastal Ranges, the climate is relatively arid with long dry summers, similar to a desert basin. Average annual precipitation on the Carrizo Plain averages between 7 and 9 inches per year. Nearly all of the precipitation falls during the months of November through April, although, there are occasional isolated thunderstorms during the summer. Data collected through the volunteer weather station program at the Cavanaugh Ranch close to the CESF site indicates that average annual precipitation may be closer to 10 inches at the project site (CESF, 2008k). Kemnitzner (1967) estimated that an average of approximately 177,000 acre-feet per year (afy) of precipitation falls on the Carrizo Plain.

During the summer, temperatures reach 90°F up to above 100°F during the day while the nights are generally cool. With the hot, dry summers, evaporation on the Carrizo Plain is considerable. Evaporation including vegetal and soil discharge of groundwater and direct evaporation from surface waters, including Soda Lake, account for approximately 118,000 afy or about 67 percent of the average annual precipitation (Kemnitzner, 1967).

Groundwater

The CESF lies within the Carrizo Plain Groundwater Basin, with approximately 270 square miles of contributing area that ultimately drains to Soda Lake (Figure 3-4, CESF, 2008k). Similar to the surface watershed, the Carrizo Plain Groundwater Basin is bounded by the Temblor Range to the east and the Caliente Range and San Juan Hills to the west. The San Andreas Fault running along the Temblor Range in a southeast-northwest direction is the dominant geologic feature in the Carrizo Plain forming the northeast boundary of the Carrizo Plain Groundwater Basin. To the west and southwest, the San Juan, Big Spring, and Morales faults run along the Caliente Range and San Juan Hills. The Temblor and Caliente Ranges are comprised of sandstone, shale, conglomerate, and siltstone that overlie an older granitic complex.

On the Carrizo Plain, groundwater is found in alluvium and the Paso Robles and Morales Formations. The alluvium is highly variable, consisting of unconsolidated to loosely consolidated sands, gravels, and silts with some layers of compacted clays. In the vicinity of the project site, the alluvium consists of primarily clay and clayey sands to a depth of about 100 feet. Underlying the alluvium, the Paso Robles Formation consists of poorly sorted, loosely consolidated gravels, sands, and silts. The Paso Robles formation is up to 3,000 feet thick near the San Andreas Fault. Along the western portion of the Carrizo Plain Groundwater Basin, where the formation is thinnest, groundwater yields may be better than areas closer to the San Andreas Fault (Kemnitzer, 1967). The lower portion of the Paso Robles Formation is comprised of fine-grained clays that limit mixing between the better quality groundwater in the Paso Robles Formation and the lower quality groundwater in the Morales Formation. Underlying the Paso Robles Formation, the Morales Formation, consists of sands, gravels, and silts ranging in thickness from just a few feet to more than 3,000 feet.

On the Carrizo Plain, in the vicinity of the project site, groundwater supply is generally obtained from two zones. The Upper Aquifer is generally less than 300 feet below ground surface (bgs) and the Lower Aquifer is at a depth of 450 to 600 feet bgs (CESF, 2008k). The Upper Aquifer provides the potable water supply to most residences and ranches on the Carrizo Plain (Kemnitzer, 1967). Domestic wells tend to be relatively shallow, less than 175 feet bgs, and yield up to about 40 gpm (CESF, 2008k). The Upper Aquifer consists of clays and sandy clays with thin layers of sand that comprise the water bearing strata (CESF, 2008k). There is considerable variability throughout the Upper Aquifer and many residents have noted problems with limited water availability (CESF, 2008k). Since the permeable sand layers are relatively thin, additional pumping from the Upper Aquifer can result in lower water levels and decreased well yields (CESF, 2008k).

The Lower Aquifer on the Carrizo Plain is generally greater than 450 feet bgs within the Paso Robles Formation. Wells within the Lower Aquifer can yield as much as 500 to 1,100 gpm (Kemnitzer, 1967). Wells that penetrate the Lower Aquifer provide irrigation water supply and community water supply. Well logs indicate that the Lower Aquifer is a confined aquifer, separated from the Upper Aquifer by relatively impermeable clay layers (Bechtel, 1984).

The groundwater with the poorest water quality is located in the alluvium near Soda Lake (Kemnitzer, 1967). Since Soda Lake is the termination for all surface flows in the Carrizo Plain Watershed, evaporation of freshwater results in mineralization of the groundwater at the lake. Groundwater quality tends to improve further from Soda Lake. Near the project site, the Upper Aquifer produces groundwater with somewhat better quality that the Lower Aquifer.

The DWR estimated that the storage capacity of the Carrizo Plain groundwater basin is about 400,000 acre-feet. San Luis Obispo County Master Water Plan update (2001) for Water Planning Area #8 – California Valley Pumping estimated annual pumping on the Carrizo Plain to be about 930 afy.

In 1967, Kemnitzer estimated that about 534 afy was pumped for domestic and livestock uses and about 4,205 afy was pumped for irrigation. Kemnitzner (1967) estimated that average annual recharge of the groundwater basin was approximately 59,000 afy or approximately 33 percent of the average annual precipitation on the Carrizo Plain. The rest of the average annual precipitation is lost to evaporation. Kenmitzner (1967) believed that much of the annual recharge is ultimately discharged out of the basin as underflow in the Lower Aquifer into the adjacent La Yeguas and San Juan subsurface drainage areas north of the Carrizo Plain.

PROJECT, SITE AND VICINITY DESCRIPTION

The proposed Carrizo Energy Solar Farm (CESF) is a 177 MW solar thermal power plant. The proposed project site is located on the Carrizo Plain in an unincorporated area of eastern San Luis Obispo County on Section 28, Township 29 South, Range 18 East, on the California Valley and La Panza NE United States Geological Survey 7.5 minute quadrangle maps (Figure 1.1-3, CESF, 2007a). The CESF is located on California State Route 58 (SR-58), approximately 36 miles east of San Luis Obispo, west of the town of Simmler and northwest of California Valley. The CESF includes 195

Compact Linear Fresnel Reflector (CLFR) solar concentrating lines and associated heat transfer equipment on a 640-acre site. The 640-acre site would be graded to form terraces for the CLFR solar concentrating lines (Figure 1.2-6, CESF, 2008h). A 380-acre construction laydown area is located south of SR-58 on Section 33. The total area occupied by the project and laydown area is approximately 1,020 acres (1.6 square miles).

The CESF is located in an area zoned for agricultural use in the San Luis Obispo County General Plan. Electrical generation is a permitted land use within an agricultural zone in the San Luis Obispo County Land Use Ordinance. The area surrounding the CESF is primarily open, undeveloped land utilized for dry farming, grazing, and rural residential land uses. The Carrisa Plains School is located approximately 1 mile south of the CESF site on the southwest corner of Section 34. Several existing residences are located within 1 mile of the project site, including residences located directly adjacent to the northern and western boundaries of the project site.

The CESF site is located adjacent to Pacific Gas and Electric's (PG&E) Morro Bay-Midway 230 kilovolt (KV) and 115 KV transmission lines. PG&E's Carrizo Plain Substation is approximately 98 feet east of the northeast corner of the project site, and the Morro Bay-Midway transmission lines are located approximately 98 feet north of the project site. The CESF project includes an electrical transmission system that will require approximately 850 feet of 230kV transmission line, of which about 90 feet is outside of the project site boundary.

The CESF is estimated to require approximately 20.8 afy of groundwater for process water, collector mirror washing, potable water, service water, and fire protection (CESF, 2008k). Groundwater would be pumped from an onsite well that extends into penetrates the confined Lower Aquifer. Groundwater would be treated with softeners, demineralization, and sanitizing equipment. Process wastewater would be recycled back into the water treatment system to minimize water demand. Sanitary wastewater would be discharged to an onsite septic system and leach field. Construction of the CESF is estimated to also require a maximum of 20.8 afy, which would also be supplied by groundwater.

Soils

The CESF project site, laydown area, and transmission line corridor are located on areas mapped by the USGS as agricultural land used primarily for dry farming or for grazing.

The soils at the proposed CESF site consist of deep, well-drained soils on alluvial deposits. Surface soils consist of fine-grained clay and silt loam, with a substratum of clay enriched soils (CESF, 2007a). The primary soil types located at the proposed project site and laydown area are listed below in **Soil & Water Table 2**. Additional soil characteristic data can be found in Tables 5.4-1 and 5.4-2 and Figure 5.4-1of the Application for Certification (AFC) (CESF, 2007a).

Soil & Water Table 2
Primary Soil Types Potentially Affected & Characteristics

Primary Soil Name	Slope Class	Water Erosion Potential	Wind Erosion Potential	Permeability	Land Capability Class
Yeguas-Pinspring Complex	0 to 5 %	Moderate	Moderate	Moderately slow, and slow	IV (irrigated) II (non-irrigated)
Thomhill Loam	2 to 5 %	Moderate	Moderate	Moderately slow	IV (irrigated) II (non-irrigated)

CESF, 2007a, Section 5.4.1.1

The soils at the proposed CESF site and laydown area are within the Yeguas-Pinspring Complex. These soils are identified as Class IV (non-prime) when not irrigated and Class II (prime) when irrigated. However, given the limited water resources available on the Carrizo Plain, the potential for irrigation at the project site is limited and dry land farming of grains may result in low yields and grazing capacity may be diminished (SLO County, 2008c). In general, soils of the project have low permeability and moderate water erosion potential. The fine-grained soils have a moderate wind erosion potential. The applicant proposes to apply groundwater during construction as the primary BMP to limit wind erosion.

The proposed project includes grading to create 17 terraces for the power block and solar field. Grading involves a balanced cut and fill of about 1,200,000 cubic yards (cy) of material. The Solar Field terraces will be laid out in four rows of four terraces with an additional terrace for the power block in the central portion of the northern part of the site (Figure 1.2-6, CESF, 2008h). Grading will be performed in phases limited to one or two terraces at a time. Clearing and grading will occur during the first six months of construction. The earthwork will utilize standard construction equipment including dozers, scrapers, excavators, loaders, compacting rollers, and dump trucks. Up to 20.8 afy of groundwater will be used during construction including the requirements for moisture conditioning and dust control during grading.

Soil and Groundwater Contamination

The proposed CESF site and laydown area have been used primarily for agricultural/ dry farming activities. A Phase I Environmental Site Assessment (ESA) was performed for the proposed project site including a site reconnaissance conducted in June 2007 (CESF, 2007a).

The Phase I ESA indicated that a 2,000-gallon diesel underground storage tank was removed from Section 27 next to the proposed CESF site in 1994. Soil sampling following tank removal did not indicate residual contamination. At the proposed CESF site, several storage drums (with unknown contents) were noted. However, the drums did not appear to be leaking, and therefore were not considered a recognized environmental condition in the Phase I ESA (CESF, 2007a). In addition, several above ground storage tanks including a 500-gallon fuel storage tank, a 1,500-gallon fuel

storage tank, and a fuel pump were located on the laydown area parcel. All of the tanks were empty during the June 2007 reconnaissance (CESF, 2007a).

The Phase I ESA did not identify any recognized environmental conditions at the proposed CESF site or laydown area. However, communications with longtime resident, John Ruscovich, indicate that there may have been a fuel storage tank on the proposed CESF site (Rusocvich, 2008a). Existing drums and any remaining storage tanks will be identified and disposed of as hazardous materials as required under RCRA. See the Waste Management Section for further discussion of potential soil and groundwater contamination and conditions of certification proposed for mitigation of any potential impacts due to environmental conditions.

Stormwater

The CESF site is located on the Carrizo Plain and receives an average annual rainfall between seven and nine inches per year (CESF, 2007a). The project includes grading to terrace the 640-acre project site and minor grading within the 380-acre laydown area. The finished project would occupy 640 acres including about 13 acres for the generating equipment at the Power Block and about 627 acres for the Solar Field terraces and perimeter swales.

Carriza Creek is the main stormwater drainage feature on the Carrizo Plain in the vicinity of the proposed CESF site. Carriza Creek conveys runoff from the northern portion of the Carrizo Plain to Soda Lake. It Carriza Creek flows from the northwest to the southeast across the southeast corner of the laydown area (Figure 1.1-3, CESF, 2007a). The Federal Emergency Management Agency (FEMA)'s Flood Insurance Rate Map (FIRM) for the Carrizo Plain indicates that portions of the CESF site near Tracy Lane and portions of the laydown area along Carriza Creek are within the FEMA designated 100-year 'Zone A' floodplain areas (Figure 5.5-1, CESF, 2007a).

Currently, runoff from two up-gradient watersheds with a contributing area of about 8.2 square miles flows onto the proposed CESF project site in two existing drainage swales (Figure 2-2, CESF, 2008k). On the proposed CESF project site, these up-gradient swales become less distinct and visible possibly due to the disturbed nature of the existing agricultural site. Runoff from the proposed CESF site and the up-gradient watersheds sheet flows to the southwest across the site and over SR-58 until it drains into the Carriza Creek in the laydown area.

During construction, the Solar Field terraces would be graded to create localized detention/infiltration areas in the center of each terrace. San Luis Obispo County standards require that projects that develop between 1 and 4 square miles limit post-construction peak flow rates to below existing peak flowrates for a 50-year design storm (SLO County, 2007). The detention/infiltration area in each Solar Field terrace is designed to contain the stormwater runoff generated in a 50-year, 10-hour (approximately 4-inches) storm event. Following construction, the runoff peak flow rate and volume discharged from the CESF project site will be less than the peak flow rate and volume discharged under existing conditions, which meets San Luis Obispo County standards. Stormwater runoff will be detained within the detention/ infiltration areas until it is infiltrated into the subsurface and evaporated. Detaining and infiltrating stormwater runoff from small frequent storms with Low Impact Design (LID) approaches including

detention/infiltration areas is a goal of hydrograph modification requirements currently being developed by San Luis Obispo County.

Offsite runoff generated in the 8.2 square mile upgradient watersheds would be routed in perimeter swales around the Solar Field (DESCP Figure 6, CESF, 2008h). Current design plans indicate that flows in the perimeter swale would overtop SR-58 allowing runoff to sheet flow across the laydown site south to the Carriza Creek. Along the northern boundary of the proposed CESF site, the perimeter swale has been designed to convey a 5- to 10-year peak discharge. Excess flows from the offsite watersheds that cannot be conveyed in the perimeter swale would sheet flow across the Solar Field terraces and be captured in the detention/infiltration areas. Along the western, eastern, and southern boundaries of the proposed CESF site, the perimeter swales have been designed to convey storm flows from a 100-year peak discharge. In total, the perimeter swales will capture about 117 acre-feet of runoff before flows overtop SR-58, sheet flow across Section 33, and drain into the Carriza Creek (CESF, 2008k).

Within the laydown area, there are two permanent drainage crossings proposed for Carriza Creek (CESF, 2008p). Each of these proposed crossings include two 48- x 48-inch box culverts with velocity dissipation at the outlets (DESCP, CESF, 2008h). The crossings are required to facilitate access to a proposed fueling station located in the southwest corner of the laydown area. At the crossing locations the existing Carriza Creek channel is 14 to 18 feet wide and about 2 feet deep (CESF, 2008p). The two box culverts are sized to convey a between a 2-year and 5-year peak flow on the Carriza Creek without overtopping the upstream creek banks (DESCP, CESF, 2008h). The project will need to submit a Stream Alteration Notification to the California Department of Fish and Game (DFG) and obtain a Streambed Alteration Agreement for these crossings.

Following construction, all non-contact runoff generated in the Power Block area will be directed via grading and swales towards the detention/infiltration areas in the Solar Field terraces. Contact runoff generated in vehicle parking and paved areas will be directed to an oil-water separator (OWS) for treatment prior to discharge to the raw water treatment system (described below). Contact runoff from active areas (in the vicinity of oil-filled transformers and hazardous material storage) that may be contaminated by oil will also be routed to the OWS.

Project Water Supply

Water will be required for dust control, moisture conditioning (for compaction), concrete, potable water and other uses during construction of the CESF. The construction water supply is estimated to be less than 20.8 afy.

During operation, water will be required for:

- Make up water for the solar thermal and steam turbine system
- Washing of solar reflectors and collectors
- Potable water
- Service water for general site uses including dust control and irrigation

- Fire protection

Untreated raw water will be supplied during both construction and operation by groundwater pumped from an existing well near the center of the CESF project site on Section 28. The existing well is approximately 591 feet bgs with a 14-inch diameter steel casing and screen. The existing well will be fitted with a 75 hp, (500 gpm) submersible pump to extract groundwater from the Lower Aquifer. Raw water will be pumped to a combination raw water/firewater storage tank.

The CESF is estimated to require about 20.8 afy of groundwater during operation. The expected average daily water use is approximately 18,500 gpd. The peak daily water use is approximately 74,000 gpd, which is expected to occur one day per year to clean the air-cooled condensers. Water usage rates are summarized below in **Soil & Water Table 3.**

Soil & Water Table 3
Carrizo Energy Solar Farm Water Usage Rates

Water Use	Average Annual (gpm)	Average Daily (gpm)	Maximum Daily (gpm)
Process Water[1]	28.4	27.6	51.0
Recovered Water[2]	28.4	27.6	51.0
Reflector Wash Water	5	7	13
Air Cooled Condenser Wash Water	0.25	0.25	32
Potable Water	5.3	5.3	5.3
Net Raw Water Use	**10.6**	**12.6**	**50.3**

CESF, 2008k, Section 1.2.2, Table 1-1
[1] Process water includes Steam Cycle Makeup, Media Filter Backwash, and Drains to the OWS.
[2] Recovered water includes Steam Drum Flash Steam, Blowdown Flash Tank Condensate, and OWS recovery.

Raw water will be pumped from the raw water storage tank to an onsite water treatment system. The water treatment system includes:

- Water softening to remove calcium carbonate and sodium carbonate. Softened water will be used for reflector cleaning.
- Demineralization in a cartridge mixed bed ion exchange system to remove suspended and dissolved solids. De-ionized water will be used as makeup water for steam drums.
- Injection of an anti-corrosive agent, a DEHA (diethyl hydroxyl amine) compound (Corrotrol) corrosion inhibitor. Condensate and feedwater circulating in the steam field will be treated with Corrotrol.
- Potable water for personnel use will be supplied with de-ionized water pumped to a potable water skid that includes sanitizing equipment and pumps for distribution and pressurization.

Virtually all of the process water will be captured, routed through the water treatment system, and reused. The net water use for CESF is primarily for potable uses, reflector wash water, and air-cooled condenser wash water. However, staff notes that the

applicant's estimate of potable water requirements of 5.3 gpm is the same for average annual, average daily, and maximum daily use. It is possible that the average annual potable water use would be less than 5.3 gpm averaged over 8,760 hours. The applicant should revisit the estimates of potable water requirements to determine if potable supply is properly computed on an average annual basis.

The 450,000 gallon raw water/firewater storage tank has sufficient capacity to provide for two days of full load operation under the maximum daily water use while maintaining 300,000 gallons of capacity for firewater storage. In the event that the water delivery system is unable to supply CESF with sufficient water, water will be transported from offsite. Two tanker trucks per day would be required to supply back-up water in the event of an interruption in the water supply system.

Process and Sanitary Wastewater

The applicant proposes two wastewater collection systems for the CESF, which will separate process wastewater from sanitary wastewater. The process wastewater system would collect all process wastewater streams from operation of the plant and deliver it to the zero liquid discharge (ZLD) system. All process wastewater including blow down from the steam turbine will be recovered, recycled through the water treatment system, and returned to the demineralizer as a makeup supply. Water from impervious surfaces in the Power Block and hazardous materials storage areas will be collected in the oil water separator and routed to the water treatment system for reuse. No wastewater would be discharged to surface waters (CESF, 2007a). Waste streams from the water treatment system will include spent resin cartridges from the demineralization process.

Other streams of wastewater include:

- Washdown water for the solar reflectors and collectors, which will evaporate off of the reflectors and collectors.
- Washdown water from the air-cooled condenser, which will evaporate (it is not clear from the materials submitted to date how the ACC washdown water will be collected for evaporation).
- Media filter backwash, which will be used for dust control.

The CESF will utilize a sanitary system consisting of a buried 1,000 gallon septic tank and leach field for all sanitary wastewater streams including toilets, sinks, and showers (CESF, 2007a). The septic system will be designed to meet San Luis Obispo County standards.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect and cumulative impacts to soil and water resources that would be caused by construction, operation and maintenance of the project. Staff's analysis of potential impacts consists of a brief description of the potential effect, an analysis of the relevant facts, and application of the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the

adequacy of the proposed mitigation. If necessary, staff presents additional or alternative mitigation measures and refers to specific conditions of certification related to a potential impact and the required mitigation measures. Mitigation is designed to reduce potentially significant project impacts to a level that is less than significant.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Impacts associated with the proposed project including depletion of local/regional water supplies, placement of fill in existing channels, and soil erosion are among those staff believes could be potentially significant. Overall, staff evaluates if the project can be built and operated without violating erosion, sedimentation, flood, surface or groundwater quality, water supply, or wastewater discharge standards. There are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. Our experience with these programs has demonstrated that they are effective. Therefore, absent unusual circumstances, we conclude that the threshold of significance for these potential impacts is based upon the ability of an applicant to identify and implement Best Management Practices (BMPs) and to prevent erosion or contamination to a level where these impacts will be less than significant. Soils can be adequately protected by development and implementation of a proper Drainage Report and Sediment and Erosion Control Plan (DRSECP) to meet the Energy Commission's and San Luis Obispo County's requirements and a Storm Water Pollution Prevention Plan (SWPPP) to meet the State Water Resources Control Board's requirements as applicable for both construction and operational phases of the project. The LORS and Policies presented in **Soil & Water Table 1** were used to determine the threshold of significance of project impacts for this proceeding.

Staff also evaluated the potential of the project's proposed water use to cause or contribute to:

- Substantial depletion or degradation of local or regional surface water supplies, including fresh water runoff delivered to Soda Lake via the Carriza Creek, or
- Substantial depletion or degradation of groundwater supplies or substantial interference with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and to operation. For each potential impact evaluation, staff briefly describes the potential effect and applies the threshold criteria for significance to its analysis of the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of an applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff mitigation measures are recommended. Staff also provides specific conditions of certification related to a potential impact and the required mitigation measures.

Construction Impacts and Mitigation

Construction of the CESF will include soil excavation, grading, installation of utility connections and the use of water, primarily for dust suppression, moisture conditioning,

and concrete mixing. Potential impacts to soils related to increased erosion or release of hazardous materials are possible during construction. Potential stormwater impacts could result if increases in runoff flow rate and volume discharged from the site were to increase flooding downstream. Water quality could be impacted by the discharge of eroded sediments from the site or hazardous materials released during construction. Project water demand could affect quantity of groundwater or surface water resources. Potential construction related impacts to soil, stormwater, and water quality or quantity, including the applicant's proposed mitigation measures and staff's proposed mitigation measures are discussed below.

Soil Erosion Potential

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. Activities that expose and disturb the ground surface leave soil particles vulnerable to detachment by wind and water. Soil erosion could result in the loss of topsoil and increased sediment loading to nearby receiving waters including the Carriza Creek and Soda Lake.

The magnitude, extent and duration of those impacts would depend on several factors, including the proximity of the CESF site to surface water, the type of soils affected, and the method, duration, and time of year of construction activities. Prolonged periods of precipitation, or high intensity and short duration runoff events coupled with earth disturbance activities can result in on-site erosion. In addition, high winds during grading and excavation activities can result in wind borne erosion leading to increased particulate emissions that adversely impact air quality. The implementation of appropriate erosion control measures will help conserve soil resources, maintain water quality, prevent accelerated soil loss, and protect air quality (DESCP, CESF, 2008h). In the **Air Quality Section**, proposed conditions of certification **AQ-SC3 and AQ-SC4** provide mitigation that will prevent significant impacts from fugitive dust and wind borne soil erosion by requiring dust control to disturbed lands during construction.

Construction of the proposed CESF facility would disturb two areas that total about 1,020 acres. In the absence of proper BMPs and due to the soil type, the project earthwork could cause significant fugitive dust and erosion. In reference to **Soil & Water Table 2**, the predominant surface soil classifications on the proposed CESF site are fine-grained clay and silt loam which have a moderate wind and water erosion potential (CESF, 2007a and SLO, 2008c).

Water and Wind Erosion

The CESF project site will be subject to wind and water erosion during construction and operation. Project construction is planned over a 35-month period (CESF, 2007a, Section 3.4.13). Grading activities are expected to occur during the first 6 months of construction. The total earth movement will be significant, including approximately 1.2 million cubic yards of material. The earthwork will consist of primarily cut and fill grading of 640 acres for the Solar Field terraces and Power Block with excavation for foundations and underground systems (CESF, 2007a, Section 3.4.13). Several factors contribute to the significant potential for water and wind erosion effects, including the high volume of earth displacement, a long duration for construction, and soil properties

that have a moderate susceptibility for wind and water erosion. The applicant has proposed the following erosion control measures: scheduling to minimize disturbed areas exposed during the rainy season; preservation of existing vegetation; use of drainage swales, ditches, and earthen berms; use of velocity dissipation devices and outlet protection; use of erosion control mats or blankets; and streambank stabilization (DESCP, CESF, 2008h). The applicant has proposed the following sediment control measures: use of silt fences, straw bales, check dams, and/or fiber rolls; use of sediment traps; stabilized construction entrance/exits; stabilized construction roadways; and street sweeping and vacuuming (DESCP, CESF, 2008h). Wind erosion will be controlled through the use of watering or other dust palliatives; controlling speeds on construction roadways; and limiting the surface area disturbed (DESCP, CESF, 2008h). These wind erosion control measures will also limit the potential for Valley Fever to impact workers and neighbors. Following construction, BMPs to stabilize the Solar Field terraces and laydown area have not yet been determined (DESCP, CESF, 2008h).

The general sequence for implementing BMPs would be to install a silt fence around the perimeter of the entire project area and along the perimeter of sub-section plots according to the phases of grading. Construction would begin in the Power Block area, followed by sections of the Solar Field terraces. Each Solar Field terrace includes a detention/infiltration area sized to detain runoff generated by a 50-year, 10-hour rainfall event that will also serve as a sediment trap. During construction (and operation), trapped sediments will need to be removed from the detention/infiltration areas to maintain infiltration rates and storage volume as needed. In addition, the perimeter swales will be graded to route offsite runoff around the Power Block and Solar Field terraces. The perimeter swales will be protected against erosion during construction with check dams. The Carriza Creek will be protected with a silt fence or similar sediment control barrier. During grading work, soil would be stabilized by maintaining sufficient water content to make it resistant to weathering and erosion by wind and water.

The applicant has prepared a draft DESCP providing conceptual plans for erosion and drainage control measures during the construction phase of CESF (CESF, 2008h). Staff believes the plan is reasonable and the sequence for implementing BMPs will avoid significant adverse impact. Condition of Certification **SOIL & WATER-2** would require the applicant to prepare a final DRSECP for both construction and operations to assure these BMPs are implemented, to address maintenance of the detention/ infiltration areas, and to identify post-construction BMPs to stabilize the Solar Field terraces and laydown area. Similar to the Energy Commission's and San Luis Obispo County's requirements to prepare a DRSECP, the RWQCB specifies that the applicant is to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) for construction activity required under Condition of Certification **SOIL & WATER-1**. In addition, the applicant must obtain a grading permit from San Luis Obispo County that will cover county specific requirements related to grading and earthwork.

The Carrizo Plain has been identified as an area that may be impacted by Cocciodioides (cocci) the fungal agent that causes Valley Fever. Valley Fever has caused flu-like symptoms in construction workers exposed to dust that contains cocci spores. The California Department of Public Health recommends that construction projects in San Luis Obispo County:

1. Update the project's Injury and Illness Prevention Program to include safeguards against Valley Fever.

2. Provide training to help workers understand the causes and symptoms of Valley Fever.

3. Control dust exposure to workers while digging and grading through standard dust control BMPs and personal protective equipment.

4. Prevent transport of soils that may be contaminated by cocci spores, and

5. Provide medical surveillance for construction workers to monitor, identify, and treat incidence of Valley Fever.

In addition to Conditions of Certification SOIL & WATER-1 and -2, Condition of Certification AQ-SC3 and AQ-SC4 in the Air Quality section of the PSA require that CESF develop and implement a plan to control fugitive dust and monitor conditions in the interest of minimizing the potential for Valley Fever to construction workers and neighboring residents.

Staff believes that through the proper application of BMPs, the impact to soil resources from water and wind erosion during construction will be reduced to a level that is less than significant.

Soil and Groundwater Contamination

The Phase I ESA did not identify any Recognized Environmental Conditions at the proposed CESF site or laydown area (CESF, 2007a). However, the Phase I ESA did identify a number of fuel storage tanks and drums onsite. Based on the presence of fuel storage tanks and drums on the CESF site and laydown areas, the applicant recognizes the potential for excavation of contaminated soils at the project site. The applicant indicates that any contaminated soils encountered will be separated, stored temporarily onsite, and ultimately removed for disposal or treatment and recycling (CESF, 2007a). Management of contaminated soils (if encountered) will be conducted in accordance with applicable federal, state, and local regulations as required by conditions of certification included in the **Waste Management** section of this PSA.

During construction, there is the potential for hazardous chemicals to be released from construction equipment or materials storage areas. The applicant will provide details related to hazardous materials storage areas and construction vehicle fueling and maintenance areas in the Construction SWPPP required in Condition of Certification **SOIL & WATER-1.** The vehicle fueling area will include 1,000-gallon gasoline and diesel storage tanks within a secondary containment area. A refueling truck equipped with spill prevention and cleanup equipment will refuel vehicles that cannot traverse to the refueling area. In the draft DESCP submitted by the applicant, the vehicle fueling station is located within the 100-year FEMA floodplain along Carriza Creek (DESCP, CESF, 2008h). The applicant has indicated that the fueling station would be located above the 100-year flood elevation and/or could be separated from the Carriza Creek channel with a berm. While these measures should limit potential impacts to the less

than significant level, staff believes that it would be preferable to locate the fueling station outside of the 100-year floodplain to further limit the potential for discharge of hazardous materials into Carriza Creek.

The applicant provided a preliminary spill response plan in Section 3.4.8.1 of the AFC (CESF, 2007a). Spill cleanup equipment including empty drums, absorbent pads and oil absorbent will be maintained near fueling areas and hazardous materials areas to respond in the event of a spill. All construction personnel will be trained in handling hazardous materials. The project will employ an onsite health and safety person, who will be responsible for implementing health and safety guidelines and notifying emergency response personnel in the event of a spill.

Staff does not believe that there will be potentially adverse impacts associated with soil and groundwater contamination by construction of the proposed CESF project.

Stormwater

Potentially significant water quality impacts could occur during construction, excavation, and grading activities if contaminated soil or other hazardous materials used during construction were to contact stormwater runoff and drain off-site. Water quality could also be adversely impacted if the stormwater drainage pattern concentrates runoff in areas that are not properly protected with BMPs causing erosion of soils and discharge of sediment into down-gradient surface waters. Flooding downstream of the project site could also increase if peak runoff flow rates discharged from the CESF project site increase.

The CESF is located in an undeveloped area utilized for dry farming, grazing, and rural residential land uses. The project site is primarily disturbed ranchland. Currently, stormwater either infiltrates into the soil, evaporates, or flows overland over SR-58 into Carriza Creek. There are two small drainage channels that drain up-gradient watersheds of approximately 8.2 square miles that flow onto the CESF site. Several factors contribute to the significant potential for stormwater erosion effects, including the high volume of earth displacement, the large area that will be disturbed, a long duration for construction, and site soil properties that have a moderate potential for water erosion.

The grading at CESF incorporates perimeter swales to route up-gradient runoff around the project site to the southwest corner of the site where the runoff will overtop SR-58 and sheet flow to Carriza Creek as currently occurs. The perimeter swales will be protected against erosion during construction using check dams constructed of hay bales (DESCP, CESF, 2008h). To limit the potential for significant erosion and water quality impacts, the perimeter swales must be in-place prior to the onset of the first rainy season during construction. The perimeter swale will also serve as a sediment trap to capture eroded sediments discharged from the project site or up-gradient of the project site resulting in improved water quality down-gradient.

Grading would begin in the Power Block area, followed by sections of the Solar Field terraces. Each Solar Field terrace includes a detention/infiltration area sized to detain runoff generated by a 50-year, 10-hour rainfall event that will also serve as a sediment trap. The detention/infiltration areas capture runoff from each Solar Field terrace and

non-contact runoff from the Power Block allowing the runoff to infiltrate to recharge the Upper Aquifer. These detention/infiltration areas will limit runoff discharged (peak flow rates and volumes) from the project site to below existing runoff discharge. This drainage approach addresses both potential impacts to surface water quality and potential increases in downstream flooding. During construction, the capacity of the detention/infiltration areas will need to be maintained by removing trapped sediment as needed.

In the construction laydown area, the applicant has proposed two permanent crossings of the Carrza Creek to facilitate access to the proposed fueling station. Each crossing consists of two 48-inch box culverts and an access road crossing the Carizza Creek. At the crossing locations the existing Carriza Creek channel is 14 to 18 feet wide and about 2 feet deep (CESF, 2008p). The two box culverts are sized to convey between a 2-year and 5-year peak flow on the Carriza Creek without overtopping the upstream creek banks. The applicant proposes to install velocity dissipation at the outlets of the culverts to limit erosion at the culvert outfalls (DESCP, CESF, 2008h).

These culverts and the access roads crossing the Carriza Creek in two locations represent fill in an existing creek channel, which could result in a potentially significant impact to the main drainage channel on the Carrizo Plain in the vicinity of the project site. The applicant has determined that the Carriza Creek below the ordinary highwater mark (OHWM) is a jurisdictional water of the US. The U.S. Army Corps of Engineers (ACOE) has issued a Preliminary Jurisdictional Determination for Carriza Creek. The placement of fill in an existing creek channel within the OHWM triggers several regulatory requirements:

- The applicant will need to obtain a Clean Water Act Nationwide 404 Permit from the USACOE. The 404 permit is currently waiting on a Section 7 Consultation from the US Fish and Wildlife Service (USFWS).

- The applicant will need to obtain a Clean Water Act 401 Water Quality Certification from the Central Coast RWQCB.

- The applicant will need to submit a Stream Alteration Notification to the California Department of Fish and Game (DFG) and obtain a Streambed Alteration Agreement to meet the requirements of California DFG Section 1600.

- The applicant will need to demonstrate that placement of culverts and fill in the Carriza Creek will not increase existing flood elevations upstream of the crossings.

Placing culverts and fill to create two permanent crossings of a jurisdictional channel to provide access to a temporary fueling station could result in a significant impacts to wildlife that utilize the Carriza Creek for habitat and migration pathways. In addition, placement of fill in the Carriza Creek channel could increase flooding upstream of the crossings resulting in a potentially significant impact. The culverts could also be subject to debris blockage during high flow events. The stage-discharge calculations presented in the draft DESCP (CESF, 2008h) indicates that flooding elevations up-gradient of the crossings would increase compared to the 100-year flow depth indicated in the Biological Assessment and Wetland Delineation submitted to ACOE (CESF, 2008p).

The applicant has already proposed use of velocity dissipation BMPs at the culvert outfalls to limit potential erosion impacts to a less than significant level.

The California DFG has indicated that they would prefer that CESF reconfigure the laydown area to avoid the need for stream crossings. Alternatively, California DFG indicated that use of temporary structures to span the small creek channel would be preferable to avoid permanent impacts to Carriza Creek. Staff concurs with the California DFG. The applicant should reconsider the Carriza Creek crossings and the location of the refueling area or consider using temporary structures that span the creek channel to avoid fill within the OHWM. While the Carriza Creek crossings can be designed to limit erosion impacts at the outfalls through the use of velocity dissipation BMPs and flooding impacts upstream of the crossings through the use of adequately sized culverts, the placement of permanent fill in an existing creek to facilitate temporary access to a fueling station should be avoided if possible.

The applicant prepared a draft DESCP in response to staff's comments, providing conceptual plans for erosion and drainage control measures during the construction and operation phases of the CESF. Staff has reviewed the DESCP and believes that the applicant has identified a reasonable conceptual BMP plan that will avoid significant adverse impacts to stormwater drainage and water quality. Condition of Certification **SOIL & WATER-2** would require the applicant to prepare a Final DRSECP for both construction and operations to assure these BMPs are implemented, including the detention/infiltration areas for the Solar Field and demonstrate that the proposed Carriza Creek crossings will not increase flooding upstream of the crossings. Similar to the Energy Commission's and San Luis Obispo County's requirements to prepare a DRSECP, the State Water Resources Control Board (SWRCB), in implementing federal law, requires the applicant to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) for construction activity; this is reflected in Condition of Certification **SOIL & WATER 1**. Several Biological Resources Conditions of Certification would require the applicant to obtain necessary permits including a 404 Permit from the USACOE (**BIO-16**), a 401 Certification from the RWQCB (**BIO-14**), and a Streambed Alteration Agreement from the California DFG (**BIO-13**).

Staff believes that through the proper application of BMPs, including the detention/ infiltration areas in the Solar Field terraces for trapping sediment and attenuating stormwater runoff equal to or below pre-developed rates, the impact to soil and water resources from stormwater drainage during construction will be reduced to a less than significant level. Provided that the applicant meets the requirements of 404 Permit, 401 Certification, and Streambed Alteration Agreement, and utilizes culverts or spans that do not increase upstream water levels, the significant stormwater related impacts associated with the Carriza Creek crossings can be mitigated to less than significant levels. However, as currently presented, it appears that the proposed crossings may increase flooding upstream of the laydown area, which does not meet San Luis Obispo County standards, and would result in a significant impact.

Construction Water Supply

Groundwater pumped from the Lower Aquifer via an onsite well will be used to meet construction water demand. The applicant estimates that construction water demand during the 3-year construction phase of the project will be less than the volume used for

operation of the facility, i.e. less than 20.8 afy. This estimate includes about 5 acre feet for concrete mixing, water required for dust control and moisture conditioning during grading activities, and water required for hydrostatic testing (CESF, 2008h).

However, the applicant has also indicated that soil moisture contents will be maintained at 15 percent to minimize dust generation to meet the requirements of the **Air Quality** conditions of certification (CESF, 2008h). Site grading includes cut and fill of 1.2 million cubic yards of material. Staff estimates that about 112 acre-feet of water is required to bring soil moisture contents up to 15 percent for the material included in the cut and fill estimates. This estimate does not include losses for evaporation and water required to control dust on access roads or disturbed areas. It is not clear from the materials submitted by the applicant to date how construction water supply was estimated. The draft DESCP indicates that construction is scheduled to begin in the first quarter of 2009, and that grading activities are expected to take about 6 months. If grading activities are performed during the rainy season, water requirements for moisture conditioning could be significantly less than 112 acre-feet. However, it is not clear that the water requirements will be less than 20.8 afy. The applicant should provide documentation demonstrating that construction water use will be less than 20.8 afy.

The groundwater use currently estimated for construction is less than the average annual use during operations (20.8 aft). Therefore, staff's impact assessment for groundwater use during operations adequately addresses groundwater use during construction.

Potable water demands during construction will be minimal. The applicant has not yet identified a separate supply of drinking water for the construction workforce. Staff assumes that bottled water will be used to supply drinking water for the construction workforce. Sanitary facilities would consist of portable toilets and would operate without water.

Provided that that the estimated groundwater during construction is less than 20.8 afy analyzed for operations, which staff finds not to cause a significant impact, staff similarly finds that groundwater use during construction will not cause a significant impact to the local groundwater supplies or quality.

Groundwater

CESF proposes to use less than 20.8 afy of groundwater for construction water supply. Since the amount of groundwater use for construction is less than that estimated for operation, staff's impact assessment for groundwater use during operation adequately addresses the use of groundwater for construction. As detailed below, staff concludes that groundwater use during construction will not significantly impact local groundwater supplies or quality.

Groundwater levels on the Carrizo Plain are a minimum of about 14 feet bgs and are about 30 feet bgs at the CESF site. The deepest excavations are anticipated to be about 8 feet bgs for trenching and foundations at the Power Block and about 3 feet bgs at the Solar Field terraces. Thus, the applicant does not anticipate encountering groundwater in excavations during construction. However, if groundwater is encountered and dewatering is required, the applicant will employ dewatering BMPs as

detailed by the California Department of Transportation (BMP NS-2). Any groundwater encountered would be sampled. Provided the groundwater is free of contaminants, the groundwater may be used for dust suppression or other onsite requirements.

Staff agrees that the likelihood of encountering significant groundwater during construction is remote. Based on the applicant's proposed dewatering operations that would be available if needed, no impacts to groundwater resources will occur during construction of the CESF.

Wastewater

The applicant estimates that approximately 237,755 gallons of raw water (groundwater) will be used for hydrostatic testing of pipelines and pressure vessels four times during construction. This water will be returned to the raw water storage tank for reuse following testing. Thus, water utilized for hydrostatic testing will not be discharged during construction. Sanitary wastes from portable toilets will be pumped to a tanker truck and disposed offsite.

Improper handling or containment of construction wastewater could cause a broader dispersion of contaminants to soil, groundwater or surface water. During construction, wastewater would be managed to maintain compliance with the required Industrial Waste Discharge Requirements issued by the Central Coast RWQCB consistent with Condition of Certification **SOIL & WATER-5**. The discharge of any non-hazardous wastewater during construction must comply with regulations for discharge. Staff concludes that no significant impact from wastewater will occur if the construction wastewater is handled in accordance with Central Coast RWQCB's Industrial Waste Discharge Requirements consistent with Condition of Certification **SOIL & WATER-5**.

Operation Impacts and Mitigation

Operation of the CESF could lead to potential impacts to soil, stormwater runoff, water quality, and water supply. Soils may be potentially impacted through erosion or the release of hazardous materials used in the operation of the CESF. Stormwater runoff from the CESF could result in potential impacts if increased runoff flow rates and volumes discharged from the CESF site increase downstream flooding. Water quality could be impacted by discharge of eroded sediments from the CESF, or discharge of hazardous materials released during operation. Water supply for plant processes, fire protection, potable uses, and landscape irrigation could lead to potential impacts to quantity or quality of regional groundwater or surface water resources. Potential impacts to soil, stormwater, water quality, water supply, and wastewater related to the operation of the CESF, including the applicant's proposed mitigation measures and staff's proposed mitigation measures, are discussed below.

Soil

The applicant has not yet identified permanent erosion control measures to mitigate potential soil related impacts from the operation of the CESF. For the Solar Field terraces, the applicant is considering several alternatives to minimize wind erosion, prevent water erosion, minimize weed and non-native vegetation growth, and provide a suitable work surface.

The applicant indicates that the laydown area will be cleared of all construction materials and the top soil will be disked and tilled to return the area to it's existing condition. The applicant has not indicated if the laydown area will be hydro-seeded or if any other surface treatment will be utilized.

Within the Solar Field, reflector mirrors and collectors will be washed on a nearly continuous basis. The applicant anticipates washing 20 collector lines per day, requiring about 530 gallons per line (CESF, 2008a). The applicant plans to use softened water with a mild bio-degradable detergent (CESF, 2008a). The wash water will be sprayed on the collectors and cleared off the surface with a squeegee. While the wash water is expected to primarily evaporate, some will deposit on the soil surface. The softened water is expected to have sodium concentrations of about 290 mg/l, nearly double the existing groundwater concentration of about 150 mg/l (CESF, 2008a). The minor amount of wash water applied, less than 0.2 inches per unit area per year, will not result in a significant accumulation in sodium concentrations in soils and will not affect soil salinity or plant toxicity.

For the portion of the solar field exposed to routine vehicular traffic such as roads used for mirror washing between rows of solar collector mirrors, staff recommends that soil be stabilized using a soil-weighting agent that absorbs into the soil particles to increase their weight and to prevent fugitive dust. Based on manufacturer's recommended maintenance frequencies, it is likely that soil stabilization using the soil bonding and weighting agents will need follow-up treatment annually and biannually, respectively. Conditions of Certification **SOIL & WATER-2 and 3** will require the implementation and maintenance of drainage and erosion control measures according to plans as specified in the Drainage Report and Sedimentation and Erosion Control Plan (DRSECP) and Industrial SWPPP. In addition, Air Quality Condition of Cerification AQ-SC7 would minimize dust related to project operations by requiring the applicant to develop and implement dust and erosion control procedures. With the BMPs detailed in the required plans, implemented and maintained, staff does not believe there would be significant impacts to soil resources during operation of CESF.

Stormwater

Staff examined several potential impacts related to stormwater. Staff verified that stormwater discharge rates from the CESF site would not exceed pre-development rates. Staff also examined the applicant's proposed drainage plans to determine if the total runoff delivered to the Carriza Creek and ultimately Soda Lake would be significantly altered. In addition, staff reviewed the applicant's conceptual plans for controlling drainage to assure that appropriate BMPs are identified to avoid degradation of water quality from erosion or contact with contaminants.

Without mitigation, runoff from the CESF site would exceed pre-development runoff due to the increase of impervious areas at the Power Block and for foundations for the collectors and mirrors in the Solar Field. The applicant has included detention/ infiltration areas within each Solar Field terrace sized to capture all runoff generated during a 50-year, 10-hour rainfall event. In total, the applicant estimates that the16 detention/infiltration areas will be able to capture up to 590 acre-feet of rainfall/runoff (CESF, 2008h). These detention/infiltration areas will reduce runoff discharge flowrates

and volumes to below pre-development rates in accordance with the San Luis Obispo County standards (SLO County, 2007d).

The preliminary design for detention/infiltration areas does not include a drainage system or any BMPs to increase and/or maintain infiltration rates. Given the clay nature of the soil, infiltration rates are likely to be relatively low (0.25 to 1 inches/day). The lowest portions of these areas could maintain shallow pools that last for several weeks following a typical rainfall event. These areas are likely to clog with fine-grained material sealing the ground surface, further reducing infiltration and increasing the duration of ponding after rainfall events. This could result in increased mosquito breeding, and become an issue for maintenance at the site. To avoid potentially significant vector control impacts, the applicant should incorporate standard infiltration BMPs in the lowest portions of the detention/infiltration areas to limit the potential for extended periods of shallow ponding. The detention/infiltration areas should be designed to drain the water quality volume (CASQA, 2003) within three to five days accounting for infiltration and average evaporation rates during the rainy season. In addition, the infiltration BMPs should be maintained annually (or as needed) to maintain sufficient infiltration rates.

In the proposed drainage plans, up-gradient runoff would be captured in perimeter swales, routed around the Solar Field and Power Block, and discharged over SR-58 to sheet flow to the Carriza Creek. The two up-gradient watersheds cover approximately 8.2 square miles or about 2 percent of the 414 square mile watershed that contributes runoff to Soda Lake. At the laydown area on Section 33, the two up-gradient watersheds cover about 20 percent of the 41.3 square mile watershed that contributes runoff to the Carriza Creek. If a significant portion of the runoff discharged from the 8.2 square mile up-gradient watersheds is detained in the perimeter swale, down-gradient water supplies including surface water flows and groundwater recharge along the Carriza Creek and discharge to Soda Lake could be significantly impacted.

The applicant indicates that the perimeter swale will capture and detain the first 117 acre-feet of runoff from the two up-gradient watersheds before runoff overtops SR-58 (CESF, 2008k). The applicant examined the 100-year, 24-hour runoff volumes, and concluded that capturing 117 acre-feet of runoff in the perimeter swales would not result in a significant impact to the total amount of runoff delivered to Carriza Creek (6,473 acre-feet) at the laydown area (CESF, 2008k). However, examining changes in runoff delivered during an extreme 100-year event does not allow for an assessment of the potential impacts during the smaller rainfall events that typically occur on the Carrizo Plain.

To estimate the likely impact of capturing runoff in the perimeter swales, staff examined 2-year, 6-hour and 24-hour events. The 2-year return period event is a relatively significant storm event that occurs once every one to two years on average; the vast majority of rainfall events are smaller than the 2-year event. Staff utilized the runoff volume estimates that the applicant provided for HEC-HMS simulations for pre- and post-project conditions (CESF, 2008k). The drainage areas are shown on Figure 2-2 in the applicant's Hydrology and Hydro-geology Report (CESF, 2008k). The results of staff's analysis are summarized below in **Soil & Water Table 4**.

Soil & Water Table 4
Carrizo Energy Solar Farm Stormwater Discharge

Location	Basin Area (square miles)	2-year, 6-hour Runoff Volume (acre-feet)	2-year, 24-hour Runoff Volume (acre-feet)
Basin 1 (Carriza Creek)	31.6	293	1,099
Basin 2 (up-gradient)	3.9	36	136
Basin 3 (up-gradient)	4.3	40	149
CESF Site (pre-project)	1.6	15	56
CESF Site (post-project)	1.6	31	85
Captured in Perimeter Swales	---	76	117
Total @ Laydown (pre-project)	41.3	382	1436
Total @ Laydown (post-project)	40.3	297	1284
Decrease in Runoff Volume	**---**	**85**	**152**

CESF, 2008k, Appendix B

Staff's analysis for the 2-year, 6-hour and 24-hour events indicates that the total runoff volume delivered to Carriza Creek at the downstream limit of the laydown area decreases by about 85 acre-feet (22%) and 152 acre-feet (11%) due to the volume of runoff captured in the perimeter swales and the Solar Field detention/infiltration areas. For the smaller rainfall events that typically fall on the Carrizo Plain the decrease in runoff delivered to Carriza Creek would be even more significant. Based on this analysis, staff concludes that capturing and detaining runoff in the perimeter swales in addition to capturing runoff in the detention/infiltration areas at the CESF site could lead to significant adverse impacts to surface water supply to the Carriza Creek and Soda Lake. In addition, groundwater recharge to the Upper Aquifer downstream of the CESF site would also be reduced potentially resulting in significant adverse impacts to the groundwater supply that down-gradient residents depend upon.

To mitigate these potentially significant adverse impacts, the applicant should revise the design of the perimeter swales to limit the total volume of runoff from the up-gradient watersheds that is captured and detained. This may be accomplished by providing a small culvert under SR-58 to allow the perimeter swale to drain following runoff events. A swale may be employed to convey runoff across the laydown area to Carriza Creek.

Staff has also reviewed the applicant's conceptual Best Management Plans (BMPs) for controlling stormwater drainage to assure that appropriate erosion control and drainage measures are identified to avoid degradation of water quality from water coming into contact with either soil or hazardous materials. Contact runoff from the Power Block area including runoff from vehicle parking areas, paved areas, and active areas that may potentially be contaminated with oil will be captured, routed to an oil water separator, and ultimately to the water treatment system for use as process water. Non-contact areas of the Power Block (where there is no potential for contamination from hazardous materials) would be graded to drain to a detention/infiltration area in the Solar Field. Secondary containment structures would be built around the oil-filled equipment and hazardous materials areas to prevent dispersion in case of a spill. Solid wastes and small amounts of hazardous waste that are generated would be properly

accounted for, tracked, handled, and disposed of off-site using licensed transporters and disposal facilities. Conditions of Certification **SOIL & WATER-2 and 3** require the project owner to prepare plans for implementing, monitoring and maintaining BMPs appropriate for the operating phase in the form of a a Drainage Report and Sedimentation and Erosion Control Plan and SWPPP for Industrial activity. The goal of the Drainage Report and Sedimentation and Erosion Control Plan is to identify any potential sources of contaminants that could be present during project operations, assure adequate BMPs are incorporated into the project's final design, and implemented for preventing pollution of soil and water resources. Compliance with Conditions of Certifications **SOIL & WATER-2 and 3** will ensure there are no significant impacts or conveyance of pollutants to Carriza Creek or to other soil and water resources.

Flooding

The CESF project site is located adjacent to the FEMA 100-year floodplain along Carriza Creek. CESF will employ detention/infiltration areas that will encourage infiltration and will attenuate any discharges so that they do not exceed the pre-developed runoff rates. Therefore, flooding downstream of the project site will not be increased as a result of the project.

However, as discussed above in the Construction Stormwater Impacts discussion, the applicant proposes two permanent crossings of the Carriza Creek in the laydown area to facilitate access to the construction fueling area. The crossings each utilize two 48-x48-inch box culverts within the existing Carriza Creek channel. Based on the hydraulic calculations presented by the applicant, the headwater depth required to pass the 25-year peak flow rate through the culverts and over the access road is over 8 feet (DESCP, CESF, 2008h). The applicant's biological assessment and wetland delineation indicates that the 100-year flow depth in the existing Carriza Creek channel is about 6 feet (CESF, 2008p). These hydraulic calculations indicate that flood depths may increase upstream of the proposed crossings, potentially resulting in significant adverse impacts to upstream properties including the Carriza Creek channel.

If the applicant does not revise the proposed project to remove the Carriza Creek crossings, the culverts must be adequately sized to convey a 100-year peak flow without increasing flood depths upstream of the crossings. Compliance with Condition of Certifications **Soil and Water-2** and **BIO-13, 14, and 16** will ensure that significant stormwater related impacts associated with the Carriza Creek crossings can be mitigated to less than significant levels.

Project Water Supply

The applicant has proposed to use up to 20.8 afy of groundwater for project operations including process water and potable water. Back up water would be trucked in to the CESF site.

Groundwater is the only source of process and potable water feasible for CESF. Given the rural, agricultural nature of the Carrizo Plain area, there is not a wastewater treatment plant with recycled water available in the vicinity of the project site. There is limited irrigated agriculture on the Carrizo Plain, and agricultural wastewater is not

available. Groundwater below the project site is located in two aquifers, the Upper Aquifer – with better water quality but lower yields, and the Lower Aquifer – with lesser water quality and higher yields. The applicant proposes to utilize lower quality groundwater from the Lower Aquifer, thereby targeting the lowest quality water reasonably available for the project's process and potable uses.

The CESF is designed as a dry, air cooled facility to minimize water usage requirements during operations. Dry air cooling is a more expensive process that uses up to 40 times less water than a more conventional wet cooled facility. The estimated water supply requirements for CESF operations of (0.12 afy/MW) are relatively low as compared to other power generating facilities (CESF, 2008k). The National Renewable Energy Laboratory estimates that a conventional wet cooled parabolic trough solar plant requires between 21 to 27 afy/MW and a dry cooled parabolic trough solar plant requires about 2.2 afy/MW. The recently licensed Victorville 2 hybrid plant included a natural gas fired combined cycle facility with a 250-acre solar-thermal system, which requires about 5.6 afy/MW. Thus, CESF's water use requirements are only 2 to 5 percent of the water use at other power generating facilities.

The operational water use at CESF represents about 5% of the average annual rainfall on the 640-acre project site. As compared to other water uses on the Carrizo Plain, the CESF's water requirements are relatively similar. If the 640-acre site were subdivided into sixteen 40-acre residential plots, those single family residences would require about 8 to 16 afy of groundwater or about 38 to 77 percent of the groundwater use at CESF. The proposed water use at CESF could irrigate about 33 acres on the 640-acre CESF site for barley production, a crop with very low water requirements. At least 400 afy (about 19 times the proposed water use at CESF) of groundwater would be required if the entire 640-area site were irrigated for barley production.

The project's potential impacts to groundwater supplies and quality are discussed below.

Groundwater

The applicant plans to pump groundwater for all process and potable uses during the operation of CESF. The applicant estimates that up 20.8 afy of groundwater will be pumped from the Lower Aquifer via an existing well located in the center of the proposed project site.

Groundwater from the Lower Aquifer generally has lower quality than groundwater from the Upper Aquifer in the vicinity of the CESF site. Groundwater samples collected from a well that penetrates the Upper Aquifer had Total Dissolved Solids (TDS) readings between 564 and 847 mg/l, where as samples collected from wells that penetrated the Lower Aquifer had TDS readings between 957 and 1140 mg/l (CESF, 2008k). State policy generally requires that power plants utilize the lowest quality water available for power plant cooling. While the CESF project is air cooled, targeting the lowest quality groundwater available at the project site adheres to the spirit of state water policy and preserves the higher quality groundwater in the Upper Aquifer for residential use.

Kemnitzer (1967) conducted the only comprehensive basin-wide study of groundwater on the Carrizo Plain. Kemnitzer's study forms the basis of later assessments of groundwater by DWR and San Luis Obispo County. Kemnitzer estimated that about 177,582 afy of rainfall fell on the Carrizo Plain. This rainfall was ultimately balanced by evapo-transpiration, groundwater pumping, and groundwater recharge. Kemnitzer estimated that about 44,800 afy was discharged to and ultimately evaporated from Soda Lake. Evapo-transpiration estimates ranged from about 46,474 afy to 71,871 afy depending on the extent of dry-farming on the Carrizo Plain. Pumping in 1967 was estimated to include about 4,205 afy for irrigation and about 534 afy for domestic and livestock use. Kemnitzer concluded that the remaining groundwater, about 55,000 afy was lost to the north as underflow.

The applicant used a groundwater model to update Kemnitzer's 1967 estimates (CESF, 2008k). The applicant identified 86 wells on the Carrizo Plain and assigned pumping rates of 1 afy to domestic wells and a 35% duty cycle to irrigation wells. In total the applicant estimated that total pumping on the Carrizo Plain was about 2,577 afy. The applicant utilized pump testing data collected by Bechtel in 1984 at the pumping well that penetrated the Lower Aquifer on the neighboring ARCO solar site to estimate hydraulic conductivities (Bechtel, 1984). K_h values ranged from 5 feet/day for the Lower Aquifer to 0.5 feet/day for the Upper Aquifer. The applicant started with an estimate of total evapo-transpiration of 118,000 afy and net annual recharge of 59,629 afy based on Kemnitzer's study. For the existing conditions (no-project scenario) the groundwater model indicated that groundwater evapo-transpiration was about 37,069 afy greater than the initial estimate of 118,000 afy and underflow losses to the north were about 19,983 afy.

For the proposed project scenario, pumping was increased by 20.8 afy to account for the proposed project. Recharge was increased at the project site by 86 afy to account for increased infiltration of stormwater in the detention/infiltration areas and perimeter swale. Recharge was also decreased by a similar amount down-gradient along Carriza Creek. With the proposed project, groundwater evapo-transpiration decreased by about 29 afy and underflow decreased by about 8 afy. Groundwater elevations in the Upper Aquifer increased by about 1.5 feet at the project site boundary and about 1 foot 3000 to 6000 feet from the pumping well (CESF, 2008k). In the Lower Aquifer, groundwater elevations decreased by about 0.5 feet within 2000 feet of the pumping well. Based on these results, the applicant concludes that there will be no significant impact to groundwater resources as a result of the proposed project.

The recharge rate for the project site utilized by the applicant was estimated based on increased infiltration within the detention/infiltration areas and the perimeter swale. However, the applicant did not take into account a decrease in evapo-transpiration at the project site. Staff's estimates of the change in infiltration and evapo-transpiration assuming that the perimeter swale does not detain runoff from up-gradient of the project site are provided below. Staff's estimate of increased recharge at the project site of 86 afy (17 afy (infiltration) + 68 afy (decreased evapo-transpiration) was similar to the applicant's estimate of increased recharge including detention in the perimeter swales. Thus, staff believes that the applicant's groundwater modeling provides a relatively conservative assessment of potential groundwater impacts. Staff believes that total recharge to the Upper Aquifer will be increased as a result of the proposed project.

Staff examined potential impacts to groundwater resources from three perspectives. First, the Lower Aquifer is a confined to semi-confined aquifer with limited connection to the Upper Aquifer. Second, the project's stormwater management plans will increase infiltration of stormwater at the site increasing recharge in the Upper Aquifer. Finally, the project involves covering the majority of the project site with mirrors and solar collectors and the resulting shade will decrease vegetation growth and evapo-transpiration resulting in increased groundwater recharge and in the Upper Aquifer.

The applicant proposes to pump lower quality groundwater from the Lower Aquifer. Kemnitzer determined from well logs that in the Lower Aquifer there were lower permeability clay layers between the Lower Aquifer and the Upper Aquifer indicating that the Lower Aquifer is a confined aquifer (Kemnitzer, 1967). The Bechtel pump test report also noted the occurrence of sand and gravel water bearing layers within thick clay/silt layers and a potentiometric level above the aquifer indicating a confined to semi-confined aquifer (Bechtel, 1984). The ARCO project was specified for a long-term withdrawal of 115 gpm from the Lower Aquifer (Bechtel, 1984). Staff has not been able to locate actual pumping or water use data from the ARCO project, however, communications with longtime resident, John Ruscovich, indicate that the pumping associated with the ARCO project did not result in noticeable impacts to groundwater levels or yields on the Carrizo Plain. The conclusion that the Lower Aquifer is a confined to semi-confined aquifer indicates the Upper and Lower Aquifers are separated and pumping from this deeper aquifer is not likely to significantly alter water levels in the Upper Aquifer that is utilized for domestic and livestock uses on the Carrizo Plain. In addition, groundwater withdrawal from the Lower Aquifer is also not likely to affect the water quality in the Upper Aquifer.

Staff also considered the potential that increased infiltration of stormwater in the detention/infiltration areas was likely to increase groundwater recharge in the Upper Aquifer. In the Hydrology and Hydrogeology Report the applicant applied a SCS Curve Number approach to 13 years of daily rainfall data collected at the Simmler rain gage (#71) to estimate average runoff depths for the project site (CESF, 2008k). The average annual rainfall at Simmler was about 10.1 inches and the average annual runoff depth was about 2.5 inches (CESF, 2008k). Applying this ratio to the estimated average annual rainfall at CESF of 8 inches per year, yields an average annual runoff depth of about 2.0 inches. Therefore, at the 640-acre CESF site about 106 acre-feet would be expected to runoff the project site. Since all onsite runoff will be captured in the detention/infiltration areas this 106 acre-feet of runoff is additional water that will be allowed to either infiltrate or evaporate. Discounting evaporation of ponded water at Soda Lake, the applicant's groundwater modeling indicates that about 83% of annual rainfall is lost to evapo-transpiration. Thus, about 17 percent of the runoff captured in the detention/infiltration areas or about 17.6 afy could be expected to recharge the Upper Aquifer, which would offset about 85 percent of the projects anticipated groundwater pumping.

Finally, staff considered changes in evapo-transpiration rates at the CESF site. The proposed project includes covering up to 90 percent of the CESF site with mirrors and collectors. These mirrors will track the sun, shading much of the ground below. This shading can be expected to significantly reduce plant growth and evapo-transpiration.

To try to estimate a potential change in evapo-transpiration rates as a result of the proposed project, staff consulted the University of California Cooperative Extension (UCCE) and California Department of Water Resources for guidance on adjusting estimated evapo-transpiration rates (UCCE, 2000). The UCCE has published a Landscape Coefficient Method for estimating evapo-transpiration of landscape plants in California. The Landscape Coefficient Method utilizes a landscape coefficient that includes factors for plant species, density, and micro-climate to estimate evapo-transpiration for a given landscape plant from the standard ET_o published by the State Agencies (CIMIS). The species, density, and micro-climate factors are multiplicative:

$$ET_L = k_s * k_d * k_{mc} * ET_o$$

The density factor, k_d, ranges from 0.5-0.9 for low density plantings, 1.0 for average density, and 1.1-1.3 for high density plantings. Since the project site will be 90% covered with mirrors and no longer dry-farmed, it is reasonable to assume that plantings on the site will have a lower density than the existing pre-project conditions. The micro-climate factor, k_{mc}, ranges from 0.5 to 0.9 for low evapo-transpiration micro-climate, 1.0 for an average climate, and 1.1 to 1.4 for a high evapo-transpiration micro-climate. An average micro-climate is defined as an open field. A low micro-climate is defined as one that is shaded (such as from a building) or covered (such as from an overhang). Staff assumed a modest adjustment for a lower density with a k_d of 0.9 and a modest adjustment for a shaded micro-climate with a k_{mc} of 0.9. Thus, applying these factors, staff estimated the change in evapo-transpiration of 81 percent (i.e. a decrease of 19%) for the proposed project site as compared to current conditions.

The average annual rainfall on the 640-acre project site results in 426 acre-feet of total rainfall, and estimates of evapo-transpiration (existing conditions) are about 83 percent of total rainfall, or 356 afy. A 19 percent reduction in evapo-transpiration associated with construction of the proposed project results in a decrease in estimated evapo-transpiration of about 68 afy.

Based on these three perspectives, staff agrees with the applicant that groundwater pumping of 20.8 afy associated with the proposed CESF project will not result in significant adverse impacts to groundwater supplies or quality. Staff expects that the project's water use will be more than offset by increased groundwater recharge as a result of stormwater infiltration in the detention/infiltration areas and decreased evapo-transpiration. In addition, staff does not believe that any existing springs in the vicinity of the project will be significantly impacted by the project's water use.

Staff proposes Condition of Certification **SOIL & WATER-4** which limits total groundwater use to a maximum of 25 afy and no more than 65 acre-feet over any consecutive three year period. These limitations on total groundwater use will ensure that significant groundwater related impacts associated with the use of groundwater at CESF will be less than significant. In addition, staff proposes Condition of Certification **Soil & Water-7**, requiring the project owner to verify that the proposed pumping well (DWR Well I.D. T29S/R18E-L03) is constructed according to San Luis Obispo County standards, has sufficient capacity to provide the project's water supply, and is screened within the Lower Aquifer. If the existing pumping well needs to be replaced, Condition of Certification **Soil & Water-7** requires the project owner to abandon the existing pumping

well and construct a new pumping well in accordance with San Luis Obispo County and State requirements.

Wastewater

The applicant proposes two separate wastewater collections systems for CESF. The process wastewater system will collect all wastewater generated from the operation of the plant and returns it to the plant's water treatment system. The water treatment system includes mixed bed ion exchange demineralization system. The ion exchange system will removes solids from the process water into ion exchange resin cartridges, which will be taken offsite for regeneration by a contract service (CESF, 2007a). Plant drainage including leakage and drainage from facility containment areas would be collected in a system of floor drains, sumps, and pipes within the CESF Power Block and discharged to an oil/water separator (CESF, 2008a). Following treatment in the oil/water separator, the contact wastewater would be routed to the water treatment system for reuse. No significant soil or water related impacts are expected if project owner meets the requirements of Condition of Certification **Soil & Water-6** that requires CESF to treat all process wastewater with a ZLD system in accordance with a ZLD management plan.

Sanitary wastewater will be routed to an onsite 1,000 gallon septic tank and leach field for all sanitary wastes from toilets, sinks, and showers. The applicant indicates that the septic tank and leach field will be designed according to San Luis Obispo County regulations and standards to avoid potential groundwater impacts. Staff has reviewed the septic tank sizing based on the standards provided in the California Plumbing Code (CPC, 2007). Using 75 employees in an office environment, CPC standards indicate that project would require a 1,500 gallon septic tank. Using the applicant's estimate of 5.3 gpm of potable water supply, CPC standards indicate that the project would require a 6,850 gallon septic tank. However, staff notes that the applicant's estimate of potable water requirements of 5.3 gpm is the same for average annual, average daily, and maximum daily use. It is possible that the average annual potable water use would be less than 5.3 gpm averaged over 8,760 hours. The applicant should revisit the estimates of potable water demand and septic system sizing to ensure that the septic system design is in accordance with San Luis Obispo County and CPC standards. No significant soil or water related impacts are expected if the project owner constructs and operates the proposed septic and leach system in accordance with a Septic Facility Permit from San Luis Obispo County as required in Condition of Certification **Soil & Water-8.**

CUMULATIVE IMPACTS AND MITIGATION

Project Water Supply

Staff evaluated the potential cumulative impacts that could be caused by the proposed CESF project's use of groundwater in combination with the proposed water use at the Optisolar's Topaz Solar Farm project. Optisolar's proposed Topaz Solar Farm project includes placement of photo-voltaic cells on several sections of land north and east of the CESF site. Optisolar's Topaz Solar Farm project estimates that it will require about 26.7 afy during a three-year construction period, and about 3.5 afy during operation.

Groundwater

Staff requested the CESF applicant to also provide groundwater modeling that reflects a combined projects scenario including anticipated groundwater pumping for both the CESF project and Optisolar's Topaz Solar Farm project. The applicant added a second hypothetical pumping well that penetrated the Lower Aquifer on Section 21 just north of the CESF project site for Optisolar's Topaz Solar Farm. There is an existing residential well that is directly between the proposed CESF pumping well and the location of the hypothetical Optisolar's Topaz Solar Farm well, so this hypothetical location results in the most conservative modeling results (i.e. models the greatest potential impact at the residential well). While the materials submitted to date by Optisolar does not identify a specific pumping well or the depth of the planned groundwater withdrawal, it is reasonable to assume that Optisolar will be required to pump from the Lower Aquifer to target the lowest quality groundwater for construction and operations at the Topaz Solar Farm.

For the combined CESF and Optisolar's Topaz Solar Farm scenario, pumping was increased by 47.5 afy to account for the two proposed projects. Recharge was adjusted at the CESF site and along the Carriza Creek to account for increased infiltration of stormwater in the detention/infiltration areas and perimeter swale at the CESF site. With the two proposed projects, groundwater evapo-transpiration decreased by about 48 afy and underflow remained about the same as compared to the no-project existing conditions scenario. Groundwater elevations in the Upper Aquifer increased by about 1.0 to 1.4 feet at the CESF project site boundary and about 1 foot 2500 to 4000 feet from the CESF pumping well (CESF, 2008k). At the residential well between the proposed CESF pumping well and the hypothetical Topaz Solar Farm well, groundwater levels in the Upper Aquifer increase by about 1.4 feet, indicating that the existing well would not be significantly impacted. In the Lower Aquifer, groundwater elevations decreased by about 0.5 feet within 2000 feet of the CESF pumping well and decreased by about 0.5 feet about 3000 feet from the hypothetical Topaz Solar Farm well. Based on these results, the applicant concludes that there will be no significant impact to groundwater resources as a result of the combined pumping associated with the proposed CESF and Optisolar's Topaz Solar Farm projects.

Optisolar's Topaz Solar Farm project includes installation of photovoltaic cells over several one-mile sections of land on the Carrizo Plain. Similar to the CESF project, staff believes that these photovoltaic cells will cause significant shading of the ground surface decreasing vegetation growth and evapo-transpiration. As described above for the CESF site, this shade could result in a decrease of approximately 68 afy of evapo-transpiration on a one square mile site. Staff believes that the Topaz Solar Farm project will result in a similar decrease in evapo-transpiration and that the recharge to the Upper Aquifer can be expected to increase. Therefore, staff does not believe that the two proposed projects will result in significant impacts to groundwater resources on the Carrizo Plain.

PUBLIC AND AGENCY COMMENTS

CDFG

In a March 26, 2008 letter to the Energy Commission, the California Department of Fish and Game provided comments on the applicant's AFC. Related to Soil and Water Resources, the California DFG requested that the applicant reconsider placement of fill in Carriza Creek by eliminating the two proposed crossings of the creek channel. Alternatively, if the crossings cannot be eliminated, California DFG requested that the proposed culverts be replaced by temporary spans.

Staff concurs with California DFG's request and has asked the applicant to re-examine the need for the Carriza Creek crossings. If the crossings cannot be eliminated, staff has asked the applicant to redesign the crossings using temporary spans if possible and to providing sufficient capacity to pass a 100-year flow rate without increasing flood depths upstream.

RWQCB

In a December 13, 2007 letter to the Energy Commission, the Central Coast RWQCB provided comments on the applicant's AFC. Related to soil and water resources, the RWQCB requested that Low Impact Design (LID) approaches be included in the project to limit potential impacts from stormwater discharge.

Staff reviewed the applicant's proposed stormwater management plans and determined that the proposed plans utilize LID approaches to limit runoff volumes and flow rates discharged from the project site to below pre-project levels.

PUBLIC

Through out the AFC review process, the public (including Robin Bell, John and Agena Ruskovich Mike Strobridge, and many others) have expressed their concerns about potential impacts to local groundwater supplies from the project proposed pumping of groundwater.

Both the applicant and staff examined this issue in detail, and determined that groundwater levels in the Upper Aquifer that local domestic users utilize for water supplies are expected to increase as a result of the proposed project and that groundwater levels in the Lower Aquifer are expected to decline by less than 0.5 feet at the site boundary.

COMPLIANCE WITH LORS

WATER SUPPLY

The Carrizo Plain is not subject to adjudication, and the use of groundwater for process water and potable uses is permitted on the Carrizo Plain.

The project would comply with:

- The Clean Water Act and the authority granted to the State to enforce coverage under the NPDES by the Central Coast Regional Water Quality Control Board and the San Luis Obispo County – Developmental Services and Flood Control Department to administer the requirements and preparation of the SWPPPs and Drainage Report and Sedimentation and Erosion Control Plan;
- The Resource Conservation Recovery Act of 1976 by the proper handling and discharge of wastewater;
- The California Constitution, Article X, Section 2 by using low quality groundwater for all plant construction and operation uses;
- The Porter-Cologne Water Quality Control Act by the use of recycled water and the implementation of the DESCP, DRSECP, and SWPPP;
- The California Safe Drinking Water and Toxic Enforcement Act by establishing secondary containment in chemical storage areas;
- Title 17 of the California Code of Regulations, by ensuring the Department of Health Services confirms the project meets the requirements for backflow prevention and cross connections of potable and non-potable water lines;
- Title 23 of the California Code of Regulations requiring the Regional Board to issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable: In the case of CESF, the project would be permitted under the General NPDES Permits for Discharge of Stormwater associated with both construction and industrial activity.
- The SWRCB Resolution 75-58 by using low quality groundwater as the most degraded source of water reasonably available to the project for all non-potable plant operational uses;
- The 2003 Integrated Energy Policy Report by use of air cooled condensers instead of wet cooling processes and by using ZLD for treatment and reuse of process wastewater;

CONCLUSIONS

Staff has not identified any immitigable potentially significant impacts to Soil and Water Resources for the Carrizo Energy Solar Farm (CESF) and believes the project will comply with all applicable Laws, Ordinances, Regulations and Standards (LORS) provided the proposed conditions of certification are implemented.

However, staff has identified several potentially significant impacts that must be addressed prior to the Final Staff Assessment and licensing, including:

- Two crossings of Carriza Creek may increase flooding upstream of the crossings. The applicant should re-examine the need for these crossings to determine if the project can be successfully constructed without placing fill in an existing stream channel. The crossing designs need to be updated to ensure that upstream flood elevations are not increased as compared to existing conditions.

- Staff believes that it would be preferable to locate the construction fueling area outside of the existing 100-year FEMA floodplain. Relocating the fueling area to the north and east of Carriza Creek could eliminate the need for the two creek crossings and the placement of fill in the creek channel.
- Water supply for construction appears to be significantly under-estimated. The applicant should provide clear documentation demonstrating that all construction requirements including dust suppression can be successfully accomplished with the estimated water supply.
- The applicant indicates that the proposed perimeter swales will capture and detain the first 117 acre-feet of runoff from two up-gradient watersheds. On the Carrizo Plain, with extremely limited water resources, capturing and detaining up-gradient runoff could result in potentially significant impacts to down-gradient surface water resources including Carriza Creek and Soda Lake and groundwater users. The applicant should include one or more culverts to route runoff across SR-58 without detention in the perimeter swales.
- Potable water supply estimates are 5.3 gpm for average annual (averaged over 8,760 hours) and maximum daily usage. The applicant should confirm the average annual and maximum daily potable water supply estimates.
- The proposed sanitary waste water system includes a 1,000 gallon septic tank and leach field. However, septic tank appears to be undersized given the number of employees and the applicant's estimate of potable water supply. The applicant should provide clear documentation demonstrating that the septic system has been designed in accordance with San Luis Obispo County and Uniform Plumbing Code standards.
- Infiltration BMPs should be added to the detention/infiltration areas to limit the potential for extended shallow ponding to increase mosquito production. The infiltration BMPs should be maintained annually or as needed to maintain sufficient infiltration to limit ponding and mosquito production.
- Post construction BMPs should be identified to stabilize soils in the laydown area and at the Solar Field.

Staff concludes the following:

- Implementation of Best Management Practices during CESF construction in accordance with effective Storm Water Pollution Prevention Plans and a Drainage, Erosion and Sedimentation Control Plan would avoid significant adverse effects that could otherwise result in significant transport of sediments or contaminants from the site by wind or water erosion.
- The proposed use of groundwater for the project's process and potable water needs would not cause a significant adverse environmental impact or affect current or future users of groundwater.
- Groundwater from the Lower Aquifer water is the most degraded quality water supply reasonably available to the project and staff considers the project consistent with state water use and conservation policies.

- The project would not be located within the 100-year flood plain, and would not exacerbate flood conditions downstream of the project.
- The proposed use of air-cooled condensers for cooling and recovery of process wastewater using Zero-Liquid-Discharge technology is consistent with state water use and conservation policies.

Where the potential for impacts has been identified, staff is proposing mitigation measures to reduce the impact to less than significant. The mitigation measures, as well as specifications for LORS conformance, are included as conditions of certification.

PROPOSED CONDITIONS OF CERTIFICATION

SOIL & WATER-1: The project owner shall comply with the requirements of the general National Pollutant Discharge Elimination System (NPDES) permit for discharge of stormwater associated with construction activity. The project owner shall develop and implement a construction stormwater pollution prevention plan (construction SWPPP) for the construction of the Carrizo Energy Solar Farm site, laydown area, and all linear facilities.

Verification: The project owner shall submit to the compliance project manager (CPM) a copy of the construction SWPPP prior to site mobilization and retain a copy on site. The project owner shall submit copies to the CPM of all correspondence between the project owner and the Central Coast Regional Water Quality Control Board regarding the NPDES permit for the discharge of stormwater associated with construction activity within 10 days of its receipt or submittal. Copies of correspondence shall include the notice of intent sent to the State Water Resources Control Board, and the board's confirmation letter indicating receipt and acceptance of the notice of intent.

SOIL & WATER-2: Prior to site mobilization, the project owner shall obtain CPM approval for a Drainage Report and Sedimentation and Erosion Control Plan (DRSECP) for managing stormwater during project construction and operations as normally administered by the San Luis Obispo County – Developmental Services and Flood Control Department. The DRSECP 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 and Solar Field terraces to meet San Luis Obispo County requirements, address exposed soil treatments in the Solar Field terraces for both road and non-road surfaces, and identify all monitoring and maintenance activities. The DRSECP shall contain elements 1 through 9 below outlining site management activities and erosion- and sediment-control BMPs to be implemented during site mobilization, excavation, construction, and post construction (operating) activities.

1. **Vicinity Map** – A map(s) at a minimum scale 1"=100' shall be provided indicating the location of all project elements (construction site, laydown area, pipelines) with depictions of all significant geographic features including swales, storm drains, and sensitive areas.

2. **Site Delineation** – All areas subject to soil disturbance for the Carrizo Energy Solar Farm (project site, 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.

3. **Watercourses and Critical Areas** – The DRSECP 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 Carrizo Energy Solar Farm construction, laydown, and landscape areas and all transmission and pipeline construction corridors.

4. **Drainage Map** – The DRSECP shall provide a topographic site map(s) at a minimum scale of 1”=100’ 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.

5. **Drainage of Project Site Narrative** – The DRSECP 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. The hydraulic analysis shall be used to support the selection of BMPs and structural controls to divert off-site and on-site drainage around or through the Carrizo Energy Solar Farm site and laydown and linear areas.

6. **Clearing and Grading Plans** – The DRSECP 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.

7. **Clearing and Grading Narrative** – The DRSECP shall include a table with the 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.

8. **Best Management Practices Plan** – The DRSECP 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 prevent wind and water erosion.

9. **Best Management Practices Narrative** – The DRSECP shall show the location (as identified in 8 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 will be available.

Verification: No later than 90 days prior to start of site mobilization, the project owner shall submit a copy of the DRSECP to San Luis Obispo County – Developmental Services and Flood Control Department and the Central Coast Regional Water Quality Control Board (Central Coast RWQCB) for review and comment. No later than 60 days prior to start of site mobilization, the project owner shall submit the DRSECP with the county's and Central Coast RWQCB's comments to the CPM for review and approval. The CPM shall consider comments by the county and Central Coast RWQCB before approval of the DRSECP. The DRSECP shall be consistent with the grading and drainage plan as required by condition of certification **CIVIL 1**, and relevant portions of the DRSECP shall clearly show approval by the chief building official. The DRSECP shall be a separate plan from the SWPPP developed in conjunction with any NPDES permit for Construction Activity. The project owner shall provide in the monthly compliance report 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 DRSECP for the life of the project and shall provide in the annual compliance report information on the results of monitoring and maintenance activities.

SOIL & WATER-3: The project owner shall comply with the requirements of the general NPDES permit for discharges of stormwater associated with industrial activity. The project owner shall develop and implement an industrial stormwater pollution prevention plan for the operation of CESF.

Verification: The project owner shall submit to the CPM a copy of the industrial SWPPP for operation of the CESF prior to commercial operation, and shall retain a copy on site. The project owner shall submit copies to the CPM of all correspondence between the project owner and the Central Coast RWQCB regarding the general NPDES permit for discharge of stormwater associated with industrial activity within 10 days of its receipt or submittal. Copies of correspondence shall include the Notice of Intent sent by the project owner to the State Water Resources Control Board.

SOIL & WATER-4: The Carrizo Energy Solar Farm shall not use more than 25 acre-feet of groundwater during any one-year period and no more than 65 acre-feet of groundwater during any consecutive three-year period. The project owner will monitor the use of groundwater and report total usage to the CPM. During severe droughts, the project owner shall work with appropriate local agencies to reduce groundwater withdrawal if groundwater levels in the Upper

Aquifer decline significantly due to project pumping. Prior to the use of groundwater during construction and commercial operation by the CESF, the project owner shall install and maintain metering devices as part of the water supply and distribution system to monitor and record in gallons per day the total volumes of water supplied to the CESF from each water source. Those metering devices shall be operational for the life of the project.

The project owner shall prepare an annual Water Use Summary, which will include the monthly range and monthly average of daily non-potable water usage in gallons per day, and total water used by the project on a monthly and annual basis in acre-feet. Potable water use on-site shall be recorded on a monthly basis. For subsequent years, the annual Water Use Summary shall also include the yearly range and yearly average water use by the project. The annual summary shall be submitted to the CPM as part of the annual compliance report.

Verification: At least 60 days prior to commercial operation of the CESF, the project owner shall submit to the CPM conclusive proof that metering devices have been installed and are operational on the groundwater supply and distribution system. If there is a significant change in the water supply source(s), the new source(s) supply and distribution system shall also have metering devices. Any water used from the new source(s) shall be incorporated into the annual Water Use Summary within 30 days of hook-up.The project owner will document total groundwater usage and report groundwater usage to the CPM. The project owner will report all disruptions to the groundwater supply, the water treatment process, the volume of backup water used, and the total annual groundwater use for the year, and the two years prior, in the annual compliance report.

If there is a significant change in the water supply source(s), the new source(s) supply and distribution system shall also have metering devices. Any water used from the new source(s) shall be incorporated into the annual Water Use Summary within 30 days of hook-up.

The project owner shall submit a Water Use Summary to the CPM in the annual compliance. The summary report shall distinguish between recorded water use of groundwater and backup water. The project owner shall provide a report on the servicing, testing and calibration of the metering devices in the annual compliance report.

SOIL & WATER-5: Prior to Carrizo Energy Solar Farm (CESF) mobilization the project owner shall obtain a Permit for Industrial Wastewater Discharge and comply with the wastewater discharge limitations, pretreatment requirements, peak flow restrictions, dewatering discharges, payment of fees, and monitoring and reporting requirements of Central Coast Regional Quality Control Board as applicable for construction.

Verification: At least 30 days prior to (CESF) site mobilization, the project owner shall provide the CPM with a copy of its Permit for Industrial Wastewater Discharge from Victor Valley Water Reclamation Authority as applicable for construction. The CPM

shall be notified in writing within 10 days of any reported non-compliance with Central Coast Regional Quality Control Board's discharge requirements, including corrective measures for non-compliance and the results of implementing those measures.

SOIL & WATER-6: The project owner shall treat all process wastewater streams with a zero liquid discharge (ZLD) system that results in a residual solid waste stored in resin cartridges. The resin cartridges shall be recycled and the solid waste shall be disposed of in the appropriate class of landfill suitable for the constituent concentrations in the waste. Surface or subsurface disposal of process wastewater from the Carrizo Energy Solar Farm (CESF) is prohibited. The project owner shall operate the ZLD system in accordance with a ZLD management plan approved by the CPM. The ZLD management plan shall include the following elements:

A. A flow diagram showing all water sources and wastewater disposal methods at the power plant;

B. A narrative of expected operation and maintenance of the ZLD system;

C. A narrative of the redundant or back-up wastewater disposal method to be implemented during periods of ZLD system shutdown or maintenance;

D. A maintenance schedule;

E. A description of on-site storage facilities and containment measures;

F. A table identifying influent water quality; and

G. A table characterizing the constituent concentrations of the solid waste or brine and specifying the permit limits of the selected landfill.

The CESF operation and wastewater production shall not exceed the treatment capacity of the ZLD system or result in an industrial wastewater discharge.

Verification: At least 60 days prior to the start of commercial operation, the project owner shall submit to the CPM evidence that the final design of the ZLD system has the approval of the CBO. At least 60 days prior to the start of commercial operation, the project owner shall prepare a ZLD management plan for review and approval by the CPM. The ZLD management plan shall be updated by the project owner and submitted to the CPM for review and approval if a change in water source or infrastructure is needed.

In the annual compliance report, the project owner shall submit a status report on operation of the ZLD system. The status report shall include: dates and length of disruptions, maintenance activities performed, volumes of interim wastewater streams stored on site, monthly volumes of residual salt cake or brine generated, and results of at least one annual sampling of the waste solids or brine comparing the constituent concentrations to the permit limits of the landfill. The annual compliance report shall contain an evaluation of whether the ZLD is being operated within the parameters described in the ZLD management plan. The ZLD management plan shall be updated

by the project owner if the CPM has determined it is necessary based on the project owner's annual compliance report(s).

SOIL&WATER-7: The project owner shall verify that the proposed pumping well on the Carrizo Solar Energy Farm site (DWR Well I.D. T29S/R18E-L03) is constructed in accordance with county well standards, has sufficient capacity to provide project water supply, and is screened within the Lower Aquifer. If the proposed pumping well (DWR Well I.D. T29S/R18E-L03) needs to be replaced during the life of the project, the project owner shall follow San Luis Obispo County requirements for abandonment of the existing well and drilling of a new pumping well screened within the Lower Aquifer. The project owner shall ensure that any new wells are completed in accordance with all applicable state and local water well construction permits and requirements. Prior to initiation of well construction activities, the project owner shall submit a well construction application to the San Luis Obispo County – Department of Environmental Health, containing all documentation, plans, 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 any groundwater therefrom until the San Luis Obispo County issues its written evaluation as to whether the proposed well construction and operation activities comply with all applicable county well requirements, and the CPM provides approval to construct the well. 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 Department of Water Resources (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 existing pumping well and any new pumping wells and shall provide the CPM with two (2) copies of all monitoring or other reports required for compliance with the San Luis Obispo County 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:

1. No later thanthirty (30) days prior to the construction of an onsite water supply well, the project owner shall submit two (2) copies to the CPM of the water well construction packet submitted to the San Luis Obispo County – Department of Environmental Health.
2. No later than fifteen (15) days prior to the construction of the onsite water supply wells, the project owner shall submit two (2) copies of the written concurrence document from the San Luis Obispo County – Department of Environmental Health indicating 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.

No later than 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 provide 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 that may be:

1. Submit copies to the CPM of any proposed well construction or operation permit changes within ten (10) days of submittal to or receipt from the San Luis Obispo County – Department of Environmental Health.

2. Submit copies of any water well permit-related well monitoring reports required by the San Luis Obispo County – Department of Environmental Health to the CPM in the annual compliance report.

3. No later than fifteen (15) days after completion of the onsite water supply wells, the project owner shall submit documentation to the CPM and the RWQCB that well drilling ac available for each well installed.

During well construction and for the operational life of the well, the project owner shall:

1. Submit copies to the CPM of any proposed well construction or operation changes for the existing pumping well or newly constructed wells.

2. Submit copies of any water well monitoring reports required by the San Luis Obispo County – Department of Environmental Health to the CPM in the annual compliance report.

3. No later than fifteen (15) days after completion of the onsite water supply wells, the project owner shall submit documentation to the CPM and the RWQCB that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any onsite drilling sumps used for project drilling activities were removed in compliance with 23 CCR section 2511(c).

SOIL&WATER-8: The project owner will comply with the requirements of the San Luis Obispo County Code, Title 19, Building and Construction Ordinance Section 19.20.220 Sewage Disposal Systems regarding a Septic Facility Permit for sanitary waste disposal facilities including the Carrizo Energy Solar Farm's proposed septic system and leach field.

Verification: The project owner will submit all necessary information and the appropriate fee to the San Luis Obispo County – Building and Planning Department to ensure that the project has complied with the county's sanitary waste disposal facilities requirements. A written assessment prepared by San Luis Obispo county of the project's compliance with these requirements must be provided to the CPM 60 days prior to the start of operation.

REFERENCES

Bechtel1984 – Bechtel Civil & Minerals, Inc. Transmittal of Test Assignment No. 1 from Mr. H.A. Balakrishna Rao to Mr. Lyle Lewis of Harding Lawson Associates. Dated 3/6/1984.

CDFG2008a – CA Dept of Fish and Game/W. E. Loudermilk (tn: 45781) California Dept of Fish and Game Comments on CESF AFC. Dated 3/26/2008. Submitted to M Dyas/Docket Unit on 3/26/2008.

CDWR2004 – CA Dept of Water Resources. Carrizo Plain Groundwater Basin, California's Groundwater. DWR Bulletin 118. Dated 2004.

CASQA2003 – CA Stormwater Quality Association. California Stormwater BMP Handbook – Industrial and Commercial. Dated 1/2003.

CESF2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

CESF2008a – Carrizo, LLC/A. Lieba URS (tn: 45465) Responses to Data Requests 1-78. Dated 2/26/2008. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 2/27/2008.

CESF2008h – Carrizo, LLC/A. Lieba URS (tn: 46925) AFC Supplement. Dated 7/3/2008. Submitted to CEC/Melissa Jones/Dockets on 7/3/2008.

CESF2008k—Carrizo, LLC/A. Lieba URS (48178), Applicant's Revised Hydrology and Hydrogeology Report, dated 9/24/2008, submitted to CEC/Melissa Jones/Dockets on 9/24/2008.

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CESF2008p—Carrizo, LLC/A. Lieba URS (tn: 48609), Submittal of Army Corps of Engineers correspondence, dated 10/15/2008, submitted to CEC/Melissa Jones/Dockets on 10/15/2008.

Kemnitzer1967 – Kemnitzer, William J. Groundwater in the Carrizo Plain, Economic Geologist, Menlo Park, CA. Dated 1967.

RWQCB2007a – Central Region Regional Water Quality Control Board/R. Briggs (tn: 43731) Comments of CESF AFC. Dated 12/13/2007. Submitted to M Dyas/Dockets on 12/14/2007.

SLOC2007c – SLO County Public Works/S. Cranor (tn: 43516) Public Works Water Unit Comments on CESF AFC. Dated 11/27/2007. Submitted to M Dyas/Dockets on 11/29/2007.

SLOC2008a – SLO County Planning Dept/J. McKenzie (tn: 45443) SLO County Planning Dept Comments on CESF AFC. Dated 2/1/8/2008. Submitted to M Dyas/Docket Unit on 2/22/2008.

SLOC2001 – SLO County Division of Public Works, Department of Water Resources. Master Water Plan Update. Prepared by EDAW. Dated 2001.

SLOC2007d – SLO County Department of Public Works. Public Improvement Standards – Storm Drainage. Dated 2007.

UCCO2000 – University of CA Cooperative Extension and CA Department of Water Resources. A Guide to Estimating Irrigation Water Needs for Landscape Plantings in California. Dated 8/2000.

TRAFFIC AND TRANSPORTATION

Jason Ricks

SUMMARY OF CONCLUSIONS

Staff has analyzed the traffic-related information provided in the Application for Certification and other sources and concludes that the Carrizo Energy Solar Farm project would have significant adverse traffic and transportation-related impacts. Staff also concludes that the applicant needs to further evaluate and propose additional mitigation measures that could reduce or eliminate the significance of these impacts.

Traffic generated during construction, particularly equipment deliveries during construction that would require pilot cars and/or California Highway Patrol escorts, would result in substantial delays to vehicle traffic along State Route 58 (SR-58), resulting in a significant, adverse direct and cumulative impact. To reduce the extent of this significant impact and to reduce the potential for conflicts between construction traffic and existing traffic along SR-58, staff has proposed Condition of Certification **TRANS-1**. Implementation of **TRANS-1** would reduce impacts during the AM and PM peak hours, however impacts during off-peak hours would remain and would be significant. Staff continues to investigate measures to reduce this impact. In order for staff to complete its analysis for the Final Staff Assessment, the applicant needs to prepare and provide staff with a comprehensive draft Traffic Mitigation Plan that identifies feasible mitigation strategies to reduce significant adverse impacts associated with project construction.

Staff has also recommended additional Conditions of Certification **TRANS-2** and **TRANS-3** to ensure the repair of physical damage to area roadways caused during project construction and to ensure safe access to the project site, respectively**.**

The Carrizo Energy Solar Farm as proposed would be consistent with all applicable laws, ordinances, regulations, and standards, including the County of San Luis Obispo traffic thresholds and the Circulation Element of the Kern County General Plan.

If the California Energy Commission elects to grant certification for this project, staff is proposing three conditions of certification.

INTRODUCTION

In the TRAFFIC AND TRANSPORTATION analysis, staff addresses the extent to which the project may impact the transportation system in the local area. This analysis focuses on whether construction and operation of the Carrizo Energy Solar Farm (CESF or project) would cause traffic and transportation impact(s) under the California Environmental Quality Act (CEQA) and whether the project would be in compliance with applicable laws, ordinances, regulations, and standards (LORS).

In this analysis staff identifies the (1) the roads and routings that are proposed for use for construction and operation; (2) potential traffic-related problems associated with the use of those routes by construction workers and truck drivers; (3) anticipated

encroachments upon public rights-of-way during the construction of the proposed project and associated facilities; (4) frequency of trips and probable routes associated with the delivery of hazardous materials; and (5) possible effect of project operations on local airport flight traffic.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

TRAFFIC AND TRANSPORTATION Table 1 provides a general description of adopted federal, state, and local LORS pertaining to traffic and transportation relevant to the proposed project.

TRAFFIC AND TRANSPORTATION Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR), Title 14 Aeronautics and Space, Part 77 Objects Affecting Navigable Airspace (14 CFR 77)	This regulation establishes standards for determining physical obstructions to navigable airspace; sets noticing and hearing requirements; and provides for aeronautical studies to determine the effect of physical obstructions to the safe and efficient use of airspace.
CFR, Title 49, Subtitle B	49 CFR Subtitle B includes procedures and regulations pertaining to interstate and intrastate transport (including hazardous materials program procedures) and provides safety measures for motor carriers and motor vehicles that operate on public highways.
State	
California Vehicle Code (CVC), Division 2, Chapter 2.5, Div. 6; Chap. 7, Div. 13; Chap. 5, Div. 14.1; Chap. 1 & 2, Div. 14.8, Div. 15	This code includes regulations pertaining to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and the transportation of hazardous materials.
California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	This code includes regulations for the care and protection of state and county highways and provisions for the issuance of written permits.
Caltrans Transportation Concept Report for State Route 58 in Caltrans District 5	This report states LOS D is considered acceptable for the section of SR-58 from post mile 3.14 to the San Luis Obispo / Kern County line.
Caltrans Transportation Concept Report for State Route 58 in Caltrans District 6	This report states LOS C is considered acceptable for the conventional highway section of SR-58 in Kern County.
Local	
San Luis Obispo County Public Works Department, Minimum Roadway Segment LOS	The County's Level of Service (LOS) standard is to maintain roadway segment LOS C or better on County roadways.
Kern County Circulation Element	The Circulation Element of the Kern County General Plan includes a goal to Maintain a minimum Level of Service (LOS) D for all roads throughout the County

SETTING

The project site is located on State Route 58 (SR-58) immediately west of Tracy Lane in an unincorporated area of eastern San Luis Obispo County that is located west of Simmler and northwest of California Valley, California. The 640-acre site consists primarily of disturbed ranchland and is currently occupied by abandoned farm structures and an abandoned residence (CESF2007a, p.1-2). The project site is located approximately five miles west of Kern County. Access to the CESF site would be provided from Tracy Lane (off of SR-58) via one new gate located at the northeastern corner of the site (CESF2007a, p.3-3).

Surrounding land uses include the agricultural uses of dry-farming and rangeland activities with a number of nearby rural residences, as well as the PG&E ROW and Carrizo Plain Substation (CESF2007a, p. 3-1).

Parking for construction workers would be provided at a 380-acre construction offsite laydown and parking area is located directly south of the project site across SR-58 (CESF2007a, p. 3-35).

CRITICAL ROADS AND FREEWAYS

TRAFFIC AND TRANSPORTATION Figure 1 shows the local transportation features as described in the Application for Certification (AFC).

The roadways discussion below is based on information obtained from the Traffic and Transportation section of the AFC (CESF2007a), San Luis Obispo County Department of Public Works, the County of San Luis Obispo Transportation Plan, the Kern County General Plan, and the California Department of Transportation (Caltrans).

Bitterwater Road

Bitterwater Road is a two-lane north-south collector connecting SR-46 with SR-58. According to San Luis Obispo County traffic counts, the average daily traffic (ADT) on Bitterwater Road is 48 vehicles per day and the peak hour traffic is 9 vehicles in each the morning and afternoon peak hours of 7:00 a.m and 4:00 p.m., respectively (SLOC2007e).

Interstate 5 (I-5)

I-5 is a major north/south route through the Central Valley and the length of California, extending from San Diego County toward the state of Oregon. Located east of the study area, I-5 provides for two mainline lanes in each direction with wide shoulders and a center median.

State Route 58 (SR-58)

SR-58 is a two-lane east-west state highway, located immediately south of the project site providing regional and primary access to the project site. The posted speed limit is 55 mph. Originating from Highway 101 (San Luis Obispo Mile Post (MP) 0.0 to 1.64), SR-58 is a two-lane conventional state highway with shoulders of four to eight feet on

flat terrain and moderate grades (CESF2007a), p.5.11-1). From San Luis Obispo MP 1.64 to 57.15 at the Kern County line to the east, it has shoulders of 0 feet to 2 feet on rolling terrain with moderate to steep grades and sharp turns.

From the Kern County line east to SR-33 (Kern MP 0.0 to MP 15.4 in Caltrans District 6), SR-58 is a two-lane conventional highway with lane widths of 9 feet to 12 feet and shoulder widths of zero feet over mountainous terrain (Caltrans2004b).

The ADT on the roadway segments within the project study area ranges from 720 vehicles per day to the west and 350 vehicles per day to the east of the project site, respectively. Peak hour traffic ranges from 50 to 80 vehicles (Caltrans2007). SR-58 is also designated as a Class III bike route as described in Caltrans District 5 bicycle map for state highways in the central coast (CESF2007a, p.5.11-1).

SR-58 is a designated as a state truck route as well as a California Legal Advisory Route with an advisory of kingpin-to-rear axle (KPRA)[1] less than 30 feet (CEC2008p). This advisory means that travel on this route by trucks with a KPRA length of 30 feet or more is not advised (CEC2008p). This advisory applies to the portion of SR-58 located between SR 229 and SR-33. Additionally, motorhomes and motorcoaches (i.e. buses) over 40 feet in length are prohibited on SR-58 (Caltrans2005a).

United States Route 101 (US-101)

US-101 is a regional roadway that originates from the south in Los Angeles, traverses San Luis Obispo County, continuing north to San Francisco. Located west of the study area, US-101 is a four-lane freeway with an interchange with SR-58.

LEVEL OF SERVICE

Level of service" (LOS) is a qualitative measure used to describe operational conditions within a traffic stream. LOS is used to describe and quantify the congestion level on a particular roadway or intersection in terms *speed*, *travel time,* and *delay.* The *Highway Capacity Manual*[2] defines six levels of service for roadways or intersections ranging from LOS A-- the best operating conditions--to LOS F—the worst. See **TRAFFIC AND TRANSPORTATION APPENDIX A** for additional information.

The County of San Luis Obispo uses the LOS criteria, as defined by the 2000 *Highway Capacity Manual*, to assess the performance of its street and highway system and the capacity of roadway segments. The County of San Luis Obispo Traffic Thresholds require that LOS C or better be maintained on all county roadways. Kern County and Caltrans require their roadways to operate at LOS D or better.

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[1] KPRA (Kingpin to rear axle) length is the distance between the rear axle of the trailer and the point at which the trailer connects to the back of the semi tractor.

[2] The *Highway Capacity Manual* is the most widely used resource for traffic analysis. The Highway Capacity Manual is prepared by the Transportation Research Board, Committee on Highway Capacity and Quality of Service. The current edition was published in 2000.

Information about the existing volume-to-capacity (V/C) ratios and LOS for roadway segments in the project vicinity that may be affected by the project during construction and/or operation is presented below in **TRAFFIC AND TRANSPORTATION Table 2**. LOS A represents free-flowing traffic; whereas, LOS F represents overcapacity operation. See **TRAFFIC AND TRANSPORTATION Table A-1** in **TRAFFIC AND TRANSPORTATION APPENDIX A** for additional information regarding V/C ratios and LOS designations.

TRAFFIC AND TRANSPORTATION Table 2
Level of Service Summary for Existing Peak Hour Conditions

Roadway	Segment	Volume	LOS
SR-58	At Cammati Creek	80	A
SR-58	West of Soda Lake	50	A
Bitterwater Road	North of Bitterwater Valley	9	A

Source: Caltrans2007, CESF2008a, and SLOC2007e

As shown above in **TRAFFIC AND TRANSPORTATION Table 2**, all study area roadway segments currently operate at an acceptable LOS.

RAILWAYS

No railroads are located in the project area or cross any of the roadway segments analyzed in this staff assessment.

PUBLIC TRANSPORTATION

There is no public transportation provider servicing the project area.

BICYCLE ROUTES

SR-58 is a designated Class III bicycle route and is used as a motorcycle recreational route (CESF2007a, p.5.11-1).

AIRPORTS

An existing private airport is located in California Valley approximate 4.0 miles southeast of the CESF site. As described in the Shandon Carrizo Area Plan, California Valley Airport is privately operated, with a functional classification of II-C (General Aviation). The airport has a 2,500-foot graded runway with minimal traffic.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

To determine whether there is a potentially significant impact generated by project, staff reviewed the project using the criteria found in the CEQA Guidelines Appendix G Environmental Checklist and applicable LORS utilized by other governmental agencies. Specifically, staff analyzed whether the proposed project would do the following:

- Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the

number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections or along roadway segments)

- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways
- 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
- Generate glare that could present a hazard to motorists or aircraft
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
- Result in inadequate emergency access
- Result in inadequate parking capacity
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Although not included as Appendix G Traffic and Transportation items, staff also discussed potential traffic and transportation impacts pertaining to nearby school operations and the transportation of hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Construction Impacts and Mitigation

Total Construction Traffic

Facility construction is projected to take place over 35 months from approximately the first quarter of 2009 through the third quarter of 2011 or first quarter of 2012. Typically, construction activity early work starts before the 7:00 a.m. to 9:00 a.m. peak hours and concludes after the 4:00 p.m. to 6:00 p.m. peak hours, but for purposes of this traffic impact analysis, it was conservatively assumed that construction worker bus traffic would commute within the 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. peak hour traffic windows.

The size of the CESF construction workforce would range from 85 in the first month to a peak of 396 during months 16 and 17. Therefore the peak number of construction workers commuting to the project site would occur in 2010. Due to the remote location of the site, the majority of construction workers would be transported to the project site each day by bus. The applicant has proposed to use 21 buses to transport workers. The buses would commute to and from the site during the morning and afternoon peak hours for a total of 84 bus trips per day during the peak construction period (21 roundtrips in the a.m. peak hour and 21 roundtrips in the p.m. peak hour).

In addition to the construction workforce bus trips, construction equipment deliveries, construction related truck traffic, and trucks related to onsite manufacturing would contribute additional trips during the construction period. All equipment deliveries would be truck trips. Additionally, the trucks required for equipment deliveries are assumed to

be of widths[3] that require use of pilot cars and/or CHP escort (URS2008). Bus, truck and heavy equipment traffic trips were estimated using a passenger car equivalent (PCE) factor of three cars for every truck or bus. **TRAFFIC AND TRANSPORTATION Table 3,** presents the peak construction traffic estimates for the CESF, and **TRAFFIC AND TRANSPORTATION Table 4** presents the estimated peak construction trip generation.

TRAFFIC AND TRANSPORTATION Table 3
Estimated Construction Traffic

Trip Type	Peak Daily Trips	AM Peak Hour			PM Peak Hour		
		In	Out*	Total	In	Out*	Total
Peak CESF Construction Buses	84	21	21	**42**	21	21	**42**
Equipment Deliveries	14	4	4	**8**	0	3	**3**
Construction Trucks	75	5	5	**10**	0	5	**5**
Onsite Manufacturing	15	2	2	**4**	1	2	**3**
Total Trips	**188**	**32**	**32**	**64**	**22**	**31**	**53**

Source: CESF2008h
* Trips leaving the site in the PM peak hour do not necessarily arrive in the PM peak hour.

TRAFFIC AND TRANSPORTATION Table 4
Estimated Peak Hour Construction Trip Generation

Trip Type	Peak Daily Trips*	AM Peak Hour			PM Peak Hour		
		In	Out**	Total	In	Out**	Total
Peak CESF Construction Buses	252	63	63	**126**	63	63	**126**
Equipment Deliveries	42	12	12	**24**	0	6	**6**
Construction Trucks	225	15	15	**30**	0	15	**15**
Onsite Manufacturing	45	6	6	**12**	3	6	**9**
Total Trips	**564**	**96**	**96**	**192**	**66**	**93**	**159**

Source: CESF2008h
* a PCE factor of 3.0 was used for all bus and truck trips
** Trips leaving the site in the PM peak hour do not necessarily arrive in the PM peak hour.

Existing traffic volume on study area roadways is presented above in **TRAFFIC AND TRANSPORTATION Table 2**. However, based on historical traffic data, the volume of traffic traveling on study area roadways is expected to rise (CESF2007a p. 5.11-8 and CESF2008h, p. 2.11-3). Because the highest number of construction workers required during construction of the CESF would occur in 2010 during months 16 and 17 of the construction schedule, Year 2010 peak construction activities represent the worst possible case traffic analysis scenario during the lifetime of the CESF. Therefore, in

[3] Caltrans Pilot Car Requirements for SR-58 are based on the width of the truck. The table below shows what type of escort is required trucks of different widths:

>10'0" to 11'0"	>11'0" to 12'0"	>12'0" to 13'0"	>14'0" to 15'0"	>15'0" to 16'0"	>16'0"
1 Pilot Car	1 Pilot Car	2 Pilot Cars	2 Pilot Cars	CHP	CHP

Sources: Caltrans 2004a, Caltrans 2005b.

order to accurately assess potential impacts of CESF peak construction traffic to the traffic and transportation system, the following two scenarios were analyzed for 2010: Year 2010 No Project conditions and Year 2010 Peak Project Construction Conditions. The Year 2010 No Project Conditions were estimated to show the volume of traffic expected along study area roadways in 2010 without the addition of project traffic and are presented below in **TRAFFIC AND TRANSPORTATION Table 5**.

TRAFFIC AND TRANSPORTATION Table 5
2010 No Project Conditions

Roadway	Segment	Peak Hour Volume	LOS
SR-58	At Cammati Creek	93	A
SR-58	West of Soda Lake	58	A
Bitterwater Road	North of Bitterwater Valley	10	A

As shown above in **TRAFFIC AND TRANSPORTATION Table 5**, all study area roadway segments are forecast to operate at an acceptable LOS under Year 2010 No Project Conditions.

To evaluate the effect of project-related peak construction traffic on area roadways, the AM and PM peak hour trips presented in **TRAFFIC AND TRANSPORTATION Table 4** were added to the Year 2010 No Project conditions presented in **TRAFFIC AND TRANSPORTATION Table 5**. The resulting Year 2010 Peak Project Construction conditions are presented below in **TRAFFIC AND TRANSPORTATION Table 6**.

TRAFFIC AND TRANSPORTATION Table 6
2010 Peak Project Construction Conditions

Roadway	Segment	AM Peak Hour		PM Peak Hour	
		Volume	LOS	Volume	LOS
SR-58	At Cammati Creek	123	A	123	A
SR-58	West of Soda Lake	190	A	157	A
Bitterwater Road	North of Bitterwater Valley	40	A	40	A

As shown above in **TRAFFIC AND TRANSPORTATION Table 6**, all study area roadway segments are forecast to operate at an acceptable LOS under Year 2010 Peak Project Construction Conditions.

All CESF construction truck traffic is expected to use SR-58 to access the site, however, SR-46 and Bitterwater Road may be used for limited trips if required (URS2008). Project construction would generate approximately 188 daily truck and bus trips to and from the project site during peak construction, however, as presented above in **TRAFFIC AND TRANSPORTATION Table 6** these trips are not expected to reduce LOS or substantially increase congestion on these roadways.

Although all study area roadways would operate at an acceptable LOS, construction-related traffic would result in delays to existing traffic on SR-58 as a result of construction related-equipment deliveries that would require use of trucks that require pilot cars and/or CHP escorts (URS2008). An analysis was performed to determine how escorted vehicles required for project-related equipment deliveries would affect traffic flow on SR-58. A typical vehicle traveling at an average speed of 45 mph on westbound SR-58 from SR-33 to the project site can negotiate the 31-mile segment in approximately 41 minutes (URS2008). A pilot car and CHP escorted vehicle traveling at an average speed of 25 mph can negotiate the same segment in approximately one hour and 12 minutes (URS2008). Therefore, non-project related vehicles would potentially be delayed approximately 31 minutes when traveling behind a pilot car or escorted project-related truck without the opportunity of passing (URS2008). A similar analysis was not performed for escorted vehicles traveling on SR-58 from San Luis Obispo, however it is reasonable to assume that similar delays would occur to vehicles traveling on east-bound SR-58.

As shown above in **TRAFFIC AND TRANSPORTATION Table 3,** during peak construction, the applicant estimates that four equipment delivery trucks would travel to and from the site in the AM peak hour and three equipment delivery trucks would travel from the site in the PM peak hour. Additionally, it is estimated that construction would require 26 daily equipment deliveries (during peak hours and off-peak hours) during peak construction and an average of 16 daily equipment deliveries throughout the 35-month construction duration. Therefore, it is likely that non-project related vehicles would experience delays of up to 31 minutes when traveling along SR-58 between 7:00 a.m. 6:00 p.m. during the 35-month construction. Because project-related traffic would result in substantial delays to non-project traffic traveling on SR-58, project impacts are considered to be significant. Therefore, to reduce the potential for delays to travelers along SR-58, staff has proposed Condition of Certification **TRANS-1**, which requires implementation of a Traffic Control Plan that includes requirements to limit construction equipment deliveries to occur outside of the AM and PM peak hours. While implementation of **TRANS-1** would reduce impacts during the AM and PM peak hours, impacts during off-peak hours would remain and would be significant. Staff continues to investigate measures to reduce this impact. In order for staff to complete its analysis for the Final Staff Assessment, the applicant needs to prepare and provide staff with a draft Traffic Mitigation Plan that demonstrates that the identified significant adverse impacts associated with project construction can be mitigated to a level of less-than-significant such as requiring escorted/piloted trucks to travel to the site via SR-46 and Bitterwater Road (which would require analysis of potential traffic impacts to SR-46) or requiring all piloted/escorted trucks to travel to and from the site at the same time each day, so delays would only occur once each day. Any measures identified will be presented in the Final Staff Assessment. Any measures identified will be presented in the Final Staff Assessment.

Additionally, the potential exists for construction truck traffic to result in unexpected damage to roads within the project area. Therefore, staff is proposing Condition of Certification **TRANS-2** which would require that any road damaged by project construction be repaired to its original condition. This would ensure that any damage to local roadways would not be a safety hazard to motorists.

Construction Workforce Parking and Laydown Area

The approximately 21 construction buses commuting to the CESF site each day would not remain onsite after delivering workers to the site and would return at the end of the day to transport workers from the site. Therefore, parking requirements during construction would be limited to assorted personal vehicles and delivery trucks. The precise number of parking spaces required during construction is unknown. However, it is reasonable to assume that the 380-acre construction laydown area would provide adequate space for any vehicles required to park at the site during construction.

SR-58 is a designated Class III bicycle route and is used as a motorcycle recreational route. All project construction traffic would traverse SR-58. Construction worker buses and truck traffic could present potential conflicts with bicyclists riding past the construction laydown area and project site. Proposed Condition of Certification **TRANS-1** also requires the applicant to provide adequate signage, lighting, and traffic control device placement at the project site and laydown areas to decrease the potential for hazards to bicyclists in the vicinity of the project.

Hazards Due to a Street Design Feature

Primary access to the CESF site would be from Tracy Lane (off of SR-58) via a new gate located at the northeastern corner of the site (CESF2007a, p.3-3). The size of the entrance to the site has not been confirmed. Therefore, staff has proposed Condition of Certification **TRANS-3**, which requires the applicant to ensure the site access is of sufficient width (at least 30 feet) to safely facilitate truck turning movements onto the CESF site.

Most construction traffic would travel from I-5 via SR-58. From the Kern County line east toward SR-33, for approximately four miles, this two-lane highway is characterized by several very sharp turns over mountainous terrain with lane widths of 9 feet to 12 feet and shoulder widths of less than one foot (Caltrans2004b). Because of these sharp turns, SR-58 is a California Legal Advisory Route with an advisory of KPRA less than 30 feet. Under this advisory, trucks with a KPRA length of 30 feet or greater are advised not to travel this roadway, however, it is not illegal for trucks with KRPA greater than 30 feet to use this roadway. Additionally, as mentioned above, buses over 40 feet in length are prohibited on SR-58 (Caltrans2005a).

The sharp turns, small shoulders, and steep drop-offs along this roadway segment present potential safety hazards to all vehicle traffic, but particularly to large vehicles such as trucks and buses due their large size and limited turning ability. Local community members have raised this issue to staff at several public meetings. Staff agrees that the sharp turns along portions of this roadway present the potential for construction trucks and buses to cross the centerline of the roadway (especially for vehicles operated by drivers who are unfamiliar with the roadway), which would present a safety hazard to oncoming traffic. Staff has coordinated with Caltrans and the California Highway Patrol (CHP) to identify methods to improve traffic safety along this roadway segment during project construction. Additionally, the applicant has

coordinated with Caltrans to identify potential off-tracking[4] areas along SR-58 (URS2008). Thus far, 12 areas have been identified along SR-58 where off-tracking may occur (URS2008). Coordination between the applicant and Caltrans to address these areas to ensure safety of all travelers along these portions of SR-58 is ongoing. To improve traffic safety during construction, proposed Condition of Certification **TRANS-1** also requires the applicant to implement any recommendations provided by Caltrans to address off-tracking issues and to prepare and implement a Truck and Bus Safety Plan that requires adherence to the Legal Advisory KPRA length, provision of funding for additional CHP units to patrol SR-58 in the project area during construction, and informing truck and bus drivers of the CHP patrols.

Linear Facilities

The CESF would connect to the existing Pacific Gas and Electric (PG&E) Morro Bay–Midway substation via a new single-circuit 230 kV overhead transmission line. The transmission line would be approximately 850 feet long and would be supported by two 115-foot tall poles and a 150-foot tall dead-end structure located within the switchyard (CESF2007a, p.3-41).

Water would be provided to the CESF either from the existing onsite well or from delivering water by truck from the surrounding areas (CESF2007a, p. 4-5). Because all potential linear facilities would be located within the property boundaries of the CESF, the PG&E substation, or PG&E's Morro Bay–Midway right-of-way (ROW), no new rights-of-way or widening of roadways would be required; therefore, no traffic delays are expected from linear facilities.

Proximity to Schools

The Carrisa Plains Elementary School is located on SR-58 approximately 0.8 mile south of the CESF site and approximately 1,000 feet southeast of the southern boundary of the construction laydown area. According to Jani Kasfeldt, Carrisa Plains Elementary School secretary and teacher's aide, the school currently serves approximately 6 kindergarten and 18 elementary school students. No students are transported to or from the school by bus; all students are dropped off in personal vehicles between 8:00 a.m. and 8:30 a.m. (Kasfeldt2008). Kindergarten students are picked up between 12:00 p.m. and 12:30 p.m. and elementary school students are picked up between 2:40 p.m. and 3:00 p.m. The pick-up and drop-off area is located on the school site and cars do not queue or park on SR-58 (Kasfeldt2008).

The proposed construction travel route would traverse SR-58 and would travel directly past the Carrisa Plains Elementary School during the AM peak hour when students are being dropped off at school. However, all students are picked up and dropped off within the drop-off and pick-up area located on school grounds. Therefore, construction traffic would not present a direct safety hazard to students at the school. However, the addition of 192 construction related trips driving past or in the immediate vicinity of the school in the AM peak hour could increase the potential for conflicts between school

[4] Off-tracking is the tendency for rear tires to follow a shorter path than the front tires when turning, which may cause rear tires to clip street signs, drive onto shoulders, or cross the centerline on a curve, creating a safety hazard for adjacent and oncoming traffic.

traffic and construction traffic. Therefore proposed Condition of Certification **TRANS-1** includes several measures to improve traffic safety in the vicinity of the Carrisa Plains Elementary School, including placement of signage in the vicinity of the school to notify drivers of school-related traffic, signage along SR-58 to notify drivers of construction-related traffic, and implementation of a Traffic Management Plan that includes redirection of construction traffic in the vicinity of the CESF site and construction laydown area with a flag person.

Operation Impacts and Mitigation

Operation Traffic

The CESF would be staffed 24 hours per day with approximately 70 employees during daytime hours and up to 5 employees during nighttime hours (CESF2007a, p. 5.11-8). Although it is likely that some of the 75 employees would travel during off-peak hours, it was assumed for this traffic analysis that all employees would commute during the 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. peak hours.

The earliest the site could begin operations is third quarter 2011. Therefore, in order to accurately assess potential impacts to the traffic and transportation system as a result of CESF operation, two scenarios were analyzed for 2011: Year 2011 No Project conditions and Year 2011 Peak Project Construction Conditions. The Year 2011 No Project Conditions were estimated to show the volume of traffic expected along study area roadways in 2011 without the addition of project traffic. Historical traffic volumes were analyzed to estimate 2011 conditions, which are presented below in **TRAFFIC AND TRANSPORTATION Table 7**.

TRAFFIC AND TRANSPORTATION Table 7
2011 No Project Conditions

Roadway	Segment	Peak Hour Volume	LOS
SR-58	At Cammati Creek	96	A
SR-58	West of Soda Lake	60	A
Bitterwater Road	North of Bitterwater Valley	11	A

As shown above in **TRAFFIC AND TRANSPORTATION Table 7**, all study area roadway segments are forecast to operate at an acceptable LOS under Year 2011 No Project conditions.

To evaluate the effect of project-related operations traffic on area roadways, the AM and PM peak hour trips presented in **TRAFFIC AND TRANSPORTATION Table 7** were added to the Year 2011 No Project conditions. Year 2011 Peak Project Construction conditions are presented below in **TRAFFIC AND TRANSPORTATION Table 8**.

TRAFFIC AND TRANSPORTATION Table 8
2011 Project Operation Conditions

Roadway	Segment	AM Peak Hour		PM Peak Hour	
		Volume	LOS	Volume	LOS
SR-58	At Cammati Creek	115	A	115	A
SR-58	West of Soda Lake	98	A	98	A
Bitterwater Road	North of Bitterwater Valley	29	A	29	A

As shown above in **TRAFFIC AND TRANSPORTATION Table 8**, all study area roadway segments are forecast to operate at an acceptable LOS under Year 2011 Project Operation Conditions.

Operation of the CESF would require approximately 75 employees. The CESF includes a paved parking area approximately 200 feet by 100 feet. The precise number of parking spaces at the proposed parking lot is unknown. However, using a conservative assumption of 10 feet by 20 feet of area required for one parking space, the applicant would need an approximate area of at least 15,000 square feet (0.34 acre) to accommodate 75 vehicles. The proposed parking lot at the CESF comprises an area of approximately 20,000 square feet (0.46 acre), which would provide adequate space for 75 vehicles. Therefore, operation of the proposed project is not expected to result in an inadequate parking capacity.

Glare

The CESF would consist of rows of mirrors that would reflect sunlight to a receiver structure. During operation, concentrated light from CESF reflectors will be directed at the absorber pipes in the receiver structure, which is approximately 56’ from ground level. As reflectors move from a stow position into tracking position with light focused on absorber pipes, there is a possibility of a concentrated beam being directed horizontally to the north or south of the CESF boundary or spilling out to the east or west. Reflected light that is directed to the south of the CESF site toward SR-58 could present a potential glare hazard to drivers on this roadway. Staff continues to investigate this issue and will provide a complete analysis in the Final Staff Assessment (FSA).

Airports

The closest airport to the CESF site is located in California Valley approximate 4.0 miles southeast of the CESF project site. As described in the Shandon Carrizo Area Plan, California Valley Airport is privately operated with a II-C (General Aviation) functional classification. The airport has a 2,500-foot graded runway with minimal traffic.

Federal Aviation Administration (FAA) Regulations, Part 77, establish standards for determining obstructions in navigable airspace and set forth requirements for notification of proposed construction. These regulations require FAA notification for any construction over 200 feet in height. In addition, notification is required if the obstruction is lower than specified heights and falls within any restricted airspace in the approaches to airports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.79 miles) from the runway. For airports with runways less than 3,200 feet, the restricted space extends 10,000 feet (1.89 miles). For heliports, the restricted space extends 5,000 feet (0.95 mile).

The tallest structure to be constructed at the CESF is a 150-foot tall transmission pole (CESF2007a, p. 3-6). Because the tallest structures at the CESF would be less than 200 feet tall and there are no public or military airports or heliports near enough for the project to fall within restricted airspace, an FAA air navigation hazard review would not be necessary. Staff concludes that the CESF would not impact aviation activities and FAA notification is not required.

Emergency Services Vehicle Access

San Luis Obispo County contracts with the California Department of Forestry to provide fire protection to the County under the CalFire/San Luis Obispo Fire Department. The Carrizo Plain Fire Station (Station No. 42) would be the first responder to an emergency at the CESF site (Trezak2008). The Carrizo Plain Fire Station is located at 13050 Soda Lake Road, approximately 3.5 miles southeast of the CESF site. The Carrizo Plain Fire Station houses one fire engine and one rescue squad vehicle. If necessary, the Carrizo Plain Fire Station would be supported by the Shandon Fire Station (Station #31) located at 501 Centre Street Shandon, CA 93441 and the La Panza Fire Station (Station #41) located at 5398 Pozo Road, Santa Margarita, CA 93453 (Trezak2008).

In the event of an emergency at the CESF site, emergency vehicles would enter the project site via Tracy Lane. With implementation of Condition of Certification **TRANS-3**, staff believes emergency services vehicle access is adequate.

Transportation of Hazardous Materials

The applicant does not estimate a maximum number of truck trips to or from the CESF per month for hazardous materials, however operation of the CESF would result in periodic generation of hazardous wastes such as used hydraulic fluid, oils, grease, oily filters, spent batteries, oily rags and absorbents. All such materials would be stored onsite for less than 90 days before being transported to an authorized disposal facility (CESF2007a pp. 3-16 and 3-17). Staff has addressed this issue in the **Hazardous Materials Management** section of this Staff Assessment. As presented in that section, staff believes that based on the environmental mobility, toxicity, the quantities at the site, and frequency of delivery, the transportation of hazardous materials to and from the CESF does not pose a significant risk.

Although the transportation and handling of hazardous materials (i.e. aqueous ammonia) can increase roadway hazard potential, impacts associated with the hazardous materials can be mitigated to a level of insignificance by compliance with existing federal and state standards established to regulate the transportation of hazardous substances. These standards constitute a comprehensive regulatory program whose purpose is to ensure the safety of hazardous materials transportation. Staff has assessed the efficacy of these standards and finds that they are successful in minimizing the risks associated with hazardous materials transportation. The applicant stated that delivery of hazardous materials would comply with Caltrans, CHP, and California Vehicle Code (CVC) (CESF2007a, p. 5.11-12).

Specific sections of the CVC and the California Streets and Highways Code ensure that the transportation and handling of hazardous materials is done in a manner that

protects public safety. Enforcement of these statutes is under the jurisdiction of the CHP.

The California Department of Motor Vehicles specifically licenses all drivers who carry hazardous materials. Drivers are required to check weight limits and conduct periodic brake inspections. Commercial truck operators handling hazardous materials are required to take instruction in first aid and procedures on handling hazardous waste spills. Drivers transporting hazardous waste are required to carry a manifest, which is available for review by the CHP at inspection stations along major highways and interstates.

The applicant would be required to comply with all LORS governing the transport, storage, and use of hazardous materials. For a more detailed discussion on the handling and disposal of hazardous substances, see the **Hazardous Materials Management** section of this Staff Assessment.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (California Code Regulation, Title 14, section 15130).

As noted in the AFC, nearly all existing and proposed projects in the vicinity of the CESF site are residential dwellings, and of the 41 planned and approved projects, six propose new residential construction. Additional projects include minor construction plans and renovations. These projects are relatively small in scale and would result in negligible additional trips to the local and regional roadway system.

However, since publication of the AFC, two additional major solar energy generation projects have been proposed within the CESF site vicinity, the Topaz Solar Farm proposed by OptiSolar Inc., and the SunPower California Valley Solar Ranch (SunPower Solar Farm). The 550 MW Topaz Solar Farm would be constructed on 6,200 acres adjacent to the northwestern boundary of the CESF (OptiSolar 2008). The Topaz Solar Farm is expected to begin power delivery in 2011 and be fully operational by 2013. The 250 MW SunPower Solar Farm would be located approximately 6.5 miles southwest of the proposed project, in the community of California Valley (PG&E 2008). The Sun Power Solar Farm is expected to begin power delivery in 2010 and be fully operational in 2012.

Because of the relative proximity of these two projects to the CESF site and their scheduled dates of completion, it is reasonable to assume that construction and operational traffic from the Topaz Sola Farm and the SunPower Solar Farm would travel the same roadways at approximately the same time as traffic from the CESF.

Trip generation information included in the application for the Topaz Solar Farm indicates that of the 250 workers required for construction, 200 would be transported to and from the site in 10 shuttle buses, and 50 workers would travel to the site in personal

vehicles (OptiSola2008). Project construction would also require approximately 35 deliveries per day as well as 135 construction trucks. Construction and operation workers for the Topaz Solar Project are expected to travel to the project site between 6:00am and 9:00am, and would leave the project site between 3:00pm and 6:00pm (OptiSolar2008). Delivery vehicles would arrive and depart at various times between 6:00am and 6:00pm (OptiSolar2008). The main access for delivery trucks to the Topaz Solar Farm would be off of Bitterwater Road via Highway 46 (OptiSolar2008). Trucks would make very minimal use of Highway 58. Construction workers may arrive from either the east or the west on Highway 58 or from the north on Bitterwater Road (OptiSolar2008). OptiSolar anticipates that a significant portion of the workforce would come from San Luis Obispo County (OptiSolar2008).

The estimated construction traffic for the Topaz Solar Project is presented below in **Traffic and Transportation Table 9**.

TRAFFIC AND TRANSPORTATION Table 9
Topaz Solar Project Estimated Construction Traffic

Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
		In	Out*	Total	In	Out*	Total
Construction Buses	40	10	10	**20**	10	10	**20**
Vehicles	100	50	0	**50**	0	50	**50**
Construction Trucks	270	41	20	**61**	0	41	**41**
Deliveries	170	26	13	**39**	0	0	**0**
Total Trips	**580**	**127**	**43**	**170**	**10**	**101**	**111**

* Trips leaving the site in the PM peak hour do not necessarily arrive in the PM peak hour.

No details regarding construction workers are currently available for the SunPower Solar Farm project, therefore, assumptions have been made to analyze this project's contribution to cumulative impacts. Because the SunPower Solar Farm is planned to be a 250 MW photovoltaic facility and the Topaz Solar Farm is planned to be a 550 MW photovoltaic facility, it is reasonable to assume that the workforce and equipment necessary to construct and operate the project would be reduced in scale compared to the Topaz Solar Farm. However, in order to provide a worst-case scenario for potential cumulative impacts, it is assumed that trip generation during construction and operation of the SunPower Solar Farm would be identical to that of the Topaz Solar Farm.

The estimated construction traffic for both the Topaz Solar Farm and the SunPower Solar Farm is presented below in **Traffic and Transportation Table 10.** Additionally, **TRAFFIC AND TRANSPORTATION Table 11** shows the estimated peak construction trip generation from the two cumulative projects based on the PCE factor of three cars per truck or bus.

TRAFFIC AND TRANSPORTATION Table 10
Cumulative Projects Estimated Construction Traffic

Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
		In	Out*	Total	In	Out*	Total
Construction Buses	80	20	20	**40**	20	20	**40**
Vehicles	200	100	0	**100**	0	100	**100**
Construction Trucks	540	82	40	**122**	0	82	**82**
Deliveries	340	52	26	**78**	0	0	**0**
Total Trips	**1160**	**254**	**86**	**340**	**20**	**202**	**222**

* Trips leaving the site in the PM peak hour do not necessarily arrive in the PM peak hour.

TRAFFIC AND TRANSPORTATION Table 11
Cumulative Projects Estimated Construction Trip Generation

Trip Type	Peak Daily Trips*	AM Peak Hour			PM Peak Hour		
		In	Out**	Total	In	Out**	Total
Construction Buses	240	60	60	**120**	60	60	**120**
Vehicles	200	100	0	**100**	0	100	**100**
Construction Trucks	1620	246	120	**366**	0	246	**246**
Deliveries	1020	156	78	**234**	0	0	**0**
Total Trips	**3080**	**562**	**258**	**820**	**60**	**406**	**466**

* a PCE factor of 3.0 was used for all bus and truck trips
** Trips leaving the site in the PM peak hour do not necessarily arrive in the PM peak hour.

To assess the potential cumulative impact of construction traffic on area roadways in the AM and PM peak hours, the peak hour trips presented above in **TRAFFIC AND TRANSPORTATION Table 11** were combined with the AM and PM peak hour conditions for the CESF presented in **TRAFFIC AND TRANSPORTATION Table 6**. The cumulative construction conditions are presented below in **TRAFFIC AND TRANSPORTATION Table 12**.

TRAFFIC AND TRANSPORTATION Table 12
Cumulative Construction Conditions

Roadway	Segment	CESF*	Cumulative Projects	Total	LOS
AM Peak Hour					
SR-58	At Cammati Creek	123	170	293	A
SR-58	West of Soda Lake	190	85	275	A
Bitterwater Road	North of Bitterwater Valley	40	565	605	C
PM Peak Hour					
SR-58	At Cammati Creek	123	135	258	A
SR-58	West of Soda Lake	157	50	207	A
Bitterwater Road	North of Bitterwater Valley	40	282	322	B

* Includes baseline traffic and CESF peak construction traffic.

As shown above in **TRAFFIC AND TRANSPORTATION Table 12,** even with the cumulative trips added to the peak CESF construction traffic, the LOS on area roadways would remain at acceptable levels during both the AM and PM peak hours.

Therefore, traffic from the CESF would not combine with traffic from other reasonably foreseeable projects to result in a cumulative significant impact during construction.

However, as described above for the CESF, any trucks requiring pilot car and/or CHP escorts would likely result in delays of up to 31 minutes to existing traffic along SR-58. Although trucks related to construction of the Topaz Solar Farm would make minimal use of SR-58, it is likely that, because of its location in California Valley, that trucks related to construction of the SunPower Solar Farm would use SR-58. It is reasonable to assume that some of these trucks would require pilot car and/or CHP escorts, which would result in delays similar to those caused by CESF truck traffic. Therefore, impacts of CESF construction traffic would combine with impacts of construction traffic from the SunPower Solar Farm to result in significant cumulative impacts.

No details regarding operational workers is available for the SunPower Solar Farm project, therefore, assumptions have been made to analyze this project's contribution to cumulative impacts. Because the SunPower Farm is planned to be a 250 MW photovoltaic facility and the Topaz Solar Farm is planned to be a 550 MW photovoltaic facility, it is reasonable to assume that this facility would require fewer full time staff than the Topaz Solar Farm. However, in order to provide a conservative basis of analysis, it is assumed that trip generation during operation of the SunPower Solar Farm would be identical to that of the Topaz Solar Farm.

Operation of the Topaz Solar Farm would require 12 full time workers (OptiSolar2008). To assess the potential cumulative impact of operational traffic on area roadways in the AM and PM peak hours, the 24 trips expected to be generated during operation of the two cumulative projects were combined with the AM and PM peak hour CESF operational conditions presented in **TRAFFIC AND TRANSPORTATION Table 8**. The cumulative operation conditions are presented below in **TRAFFIC AND TRANSPORTATION Table 13**.

TRAFFIC AND TRANSPORTATION Table 13
Cumulative Operation Conditions

Roadway	Segment	CESF*	Cumulative Projects	Total	LOS
AM Peak Hour					
SR-58	At Cammati Creek	115	10	125	A
SR-58	West of Soda Lake	98	6	104	A
Bitterwater Road	North of Bitterwater Valley	29	8	37	A
PM Peak Hour					
SR-58	At Cammati Creek	115	10	125	A
SR-58	West of Soda Lake	98	6	104	A
Bitterwater Road	North of Bitterwater Valley	29	8	37	A

* Includes baseline traffic and CESF operational traffic.

As shown above in **Traffic and Transportation Table 13,** even with the cumulative trips added to the peak CESF operational traffic, the LOS on area roadways would remain at acceptable levels during both the AM and PM peak hours. Therefore, traffic from the CESF would not combine with traffic from other reasonably foreseeable projects to result in a cumulative significant impact during operation.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

TRAFFIC AND TRANSPORTATION Table 14 provides a general description of applicable statutes, regulations, and standards adopted by the federal government, the State of California, and Kern and San Luis Obispo Counties pertaining to traffic and transportation with which the project is required to comply. Conditions of certification have been proposed to ensure project consistency with a law, ordinance, regulation, or standard where it was not already mandated by federal or state regulations.

TRAFFIC AND TRANSPORTATION Table 14
Project Compliance with Adopted Traffic and Transportation LORS

Applicable Law	LORS Description and Project Compliance Assessment
Federal	
Code of Federal Regulations (CFR), Title 14, section 77 (14 CFR 77)	Includes standards for determining physical obstructions to navigable airspace. Sets forth requirements for notice to the Federal Aviation Administration of certain proposed construction or alteration. Also provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace (including temporary flight restrictions).
	The project does not have any structures exceeding 200 feet in height and is beyond restricted airspace of airports in the region; therefore no notification to the FAA is required.
CFR, Title 49, Subtitle B	Includes procedures and regulations pertaining to interstate and intrastate transport (includes hazardous materials program procedures) and specifies safety measures for motor carriers and motor vehicles that operate on public highways.
	Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permitting (e.g., California Department of Motor Vehicles licensing, Caltrans permits), and/or local agency permitting.
State	
California Vehicle Code, Division 2, Chapter. 2.5; Div. 6, Chap. 7; Div. 13, Chap. 5; Div. 14.1, Chap. 1 & 2; Div. 14.8; Div. 15	Includes regulations pertaining to licensing, size, weight, and load of vehicles operated on highways; safe operation of vehicles; and the transportation of hazardous materials.
	Enforcement is provided by state and local law enforcement agencies and through ministerial state agency licensing and permitting and/or local agency permitting.

California Streets and Highway Code, Division 1 & 2, Chapter 3 & Chapter 5.5	Includes regulations for the care and protection of state and county highways and provisions for the issuance of written permits.
	Enforcement is provided by state and local law enforcement and through ministerial state agency licensing and permitting and/or local agency permitting.
Caltrans Transportation Concept Report for State Route 58 in Caltrans District 5	The CESF would comply with the Caltrans District 5 minimum LOS D standard.
Caltrans Transportation Concept Report for State Route 58 in Caltrans District 6	The CESF would comply with the Caltrans District 6 minimum LOS C standard.
Local	
San Luis Obispo County Public Works Department, Minimum Roadway Segment LOS	The County's LOS standard is to maintain roadway segment LOS C or better on County roadways.
	The CESF would comply with the San Luis Obispo County minimum LOS C standard.
San Luis Obispo County Public Works Department, Minimum Roadway Segment LOS	The Circulation Element of the Kern County General Plan includes a goal to maintain a minimum Level of Service (LOS) D for all roads throughout the County
	The CESF would comply with the Kern County minimum LOS D standard.

NOTEWORTHY PUBLIC BENEFITS

Neither the applicant nor staff has identified any traffic-related benefits associated with the CESF.

CONCLUSIONS

Staff has analyzed the project's potential construction and operational impacts to the regional and local traffic and transportation system, and concludes the following: Although construction-related traffic would not result in an unacceptable level of service along study area roadways, construction-related equipment deliveries requiring pilot car and/or CHP escorts would result in substantial delays to existing traffic along SR-58, resulting in a significant impact. Although proposed Condition of Certification **TRANS-1** includes measures to reduce this impact during the AM and PM peak hours, delays during off-peak hours would remain significant. Staff continues to investigate measures to reduce this impact.

1. In order for staff to complete its analysis for the Final Staff Assessment, the applicant needs to prepare and provide staff with a draft Traffic Mitigation Plan that demonstrates that the identified significant adverse impacts associated with project construction can be mitigated to a level of less-than-significant such as requiring escorted/piloted trucks to travel to the site via SR-46 and Bitterwater Road (which

would require analysis of potential traffic impacts to SR-46) or requiring all piloted/escorted trucks to travel to and from the site at the same time each day, so delays would only occur once each day. Any measures identified will be presented in the Final Staff Assessment. .

2. During operation, because project-related traffic would not result in an unacceptable level of service along study area roadway segments or intersections, potential impacts created by workforce traffic and truck traffic would be less than significant.

3. CESF construction would generate truck traffic trips that would pass directly adjacent to a school facility, however, proposed Condition of Certification **TRANS-1** includes measures to improve traffic safety in the vicinity of the Carrisa Plains Elementary School.

4. During construction the project would generate truck traffic trips along a designated bicycle route. However, staff proposed Condition of Certification **TRANS-1** includes measures to avoid construction traffic conflicts with pedestrians and bicyclists.

5. The applicant has not provided dimensions for the site access, however, staff has proposed Condition of Certification **TRANS-3** to ensure site access is of sufficient width (at least 30 feet) to safely facilitate truck turning movements onto the CESF site.

6. Construction and operation of the CESF would not result in inadequate parking capacity.

7. Sharp curves along SR-58 present a safety hazard to construction truck and bus drivers who are unfamiliar with the roadway. However, staff has proposed Condition of Certification **TRANS-1** to increase traffic safety along this roadway segment.

8. The project would not adversely affect aircraft operations associated with any aircraft flight traffic.

9. Construction of linear facilities associated with the CESF would not result in adverse impacts to the traffic and transportation system.

10. CESF impacts related to substantial delays to existing traffic along SR-58 would combine with similar impacts from the proposed SunPower Solar Farm to result in a significant cumulative impact.

If the Energy Commission elects to grant certification for this project, staff is proposing four conditions of certification.

PROPOSED CONDITIONS OF CERTIFICATION

TRAFFIC CONTROL AND IMPLEMENTATION PLAN

TRANS-1 Prior to construction of the CESF, the project owner shall prepare and implement a traffic control and implementation plan for the CESF construction traffic, containing:

- a Traffic Management Plan addressing the movement of vehicles and materials, including arrival and departure schedules, designated workforce and delivery routes, and implementation of Caltrans recommendations to prevent off-tracking along SR-58.
- one dedicated crossing point between the CESF site and the construction laydown area to eliminate multiple crossings across SR-58.
- redirection of construction traffic in the vicinity of the CESF site and construction laydown area with a flag person.
- signage, lighting, and traffic control device placement at the project construction site and laydown areas.
- signage placed along the south and north shoulders of SR-58 at one-mile intervals from SR-33 to SR-229 notifying drivers of increased construction traffic on SR-58 and the duration of the construction period.
- signage placed along the south and north shoulders of SR-58 at distances of 1.0 mile, one half mile, one quarter mile, and 500 feet of the Carissa Plains Elementary School notifying drivers of the school entrance and school traffic.
- a Heavy Haul Plan addressing the transport and delivery of heavy and oversized loads requiring permits from Caltrans or other state and federal agencies.
- A Truck and Bus Safety Plan that ensures:
    - that construction equipment deliveries requiring pilot cars and/or CHP escorts are limited to traveling along SR-58 during off peak hours (between 9:00 am and 4:00 PM)
    - that designated pick-up and drop-off areas are located on-site and do not result in buses parking or queuing along SR-58;
    - all project-related construction traffic adheres to the California Legal Advisory of KPRA less than 30 feet;
    - all project-related construction traffic adheres to the prohibition of buses over 40 feet in length on SR-58;
    - funding for at least two (2) additional CHP units or CHP Commercial Officers to patrol SR-58 through the entire construction duration is provided to CHP;
    - all construction truck and bus drivers are informed of road conditions along SR-58;
    - all construction truck and bus drivers are informed of the additional CHP patrols; and
    - any truck travel along Bitterwater Road shall be restricted to daylight hours.

The project owner shall consult with the County of San Luis Obispo and Caltrans in the preparation and implementation of the traffic control and

implementation plan and shall submit the proposed traffic control plan to the County of San Luis Obispo and Caltrans in sufficient time for review and comment and to the CPM for review and approval prior to the proposed start of construction and implementation of the plan. The project owner shall provide a copy of any written comments from the County of San Luis Obispo or Caltrans and any changes to the traffic control plan to the CPM prior to the proposed start of construction.

Verification: At least 90 calendar days prior to the start of construction, including any grading or site remediation on the project site or its associated easements, the project owner shall submit the proposed traffic control and implementation plan to the County of San Luis Obispo and Caltrans 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 San Luis Obispo and Caltrans 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 San Luis Obispo or Caltrans, along with any changes to the proposed development plan to the CPM for review and approval.

REPAIR OF PUBLIC RIGHT-OF-WAY

TRANS-2 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.

Prior to the start of site mobilization, the project owner shall consult with the County of San Luis Obispo and Caltrans and notify them of the proposed schedule for project construction. The purpose of this notification is to request that the local jurisdiction and 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.

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 segment(s) and/or intersections and shall provide the Energy Commission Compliance Project Manager (CPM), the affected local jurisdiction(s) and Caltrans (if applicable) with a copy of these images.

Within 60 calendar days after completion of construction, the project owner shall meet with the CPM, the affected local jurisdiction(s) and Caltrans (if applicable) 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 affected local jurisdiction(s) and Caltrans stating their satisfaction with the repairs to the CPM.

DESIGN OF SITE ACCESS

TRANS-3 The project owner shall coordinate with CPM to ensure that all site access driveways are at least 30 feet wide to facilitate safe turning movements for trucks into the CESF site.

Verification: At least 90 days prior to start of construction, the project owner shall provided scaled engineering drawings to the CPM that demonstrates the site access is of adequate width.

REFERENCES

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HIGHWAY CAPACITY MANUAL

The *Highway Capacity Manual* is prepared by the Transportation Research Board, Committee on Highway Capacity and Quality of Service. It represents a concentrated, multi-agency effort by the Transportation Research Board, the Federal Highway Administration, the American Association of Highway and Transportation Officials, and other traffic/transportation related agencies. It is the most widely used resource for traffic analysis. Several versions of the Highway Capacity Manual have been published. The current edition was published in 2000. It contains concepts, guidelines, and computational procedures for computing the capacity and quality of service of various highway facilities, including freeways, signalized and unsignalized intersections, rural highways, and the effects of transit, pedestrians, and bicycles on the performance of these systems.

LEVEL OF SERVICE

The description and procedures for calculating capacity and level of service are found in the *Highway Capacity Manual 2000*. The *Highway Capacity Manual 2000* represents the latest research on capacity and quality of service for transportation facilities.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with level of service A representing the best operating conditions and level of service F the worst. Each level of service represents a range of operating conditions and the driver's perception of these conditions. Safety is not included in the measures that establish service levels. A general description of service levels for various types of facilities is shown in **Table A-1**.

TRAFFIC AND TRANSPORTATION Table A-1
Level of Service Description

Facility Type	Uninterrupted Flow	Interrupted Flow
	Freeways Multi-Lane Highways Two-Lane Highways Urban Streets	Signalized Intersections Unsignalized Intersections - Two-Way Stop Control - All-Way Stop Control
Level of Service		
A	Free-flow	Very low delay
B	Stable flow. Presence of other users noticeable.	Low delay
C	Stable flow. Comfort and convenience starts to decline.	Acceptable delay
D	High density stable flow	Tolerable delay
E	Unstable flow	Limit of acceptable delay
F	Forced or breakdown flow	Unacceptable delay
Source: *Highway Capacity Manual 2000*		

Interrupted Flow

One of the more important elements limiting, and often interrupting, the flow of traffic on a highway is the intersection. Flow on an interrupted facility is usually dominated by points of fixed operation such as traffic signals and stop and yield signs. These all operate quite differently and have differing impacts on overall flow.

Signalized Intersections

The capacity of a highway is related primarily to the geometric characteristics of the facility, as well as to the composition of the traffic stream on the facility. Geometrics are a fixed, or non-varying, characteristic of a facility.

At the signalized intersection, an additional element is introduced into the concept of capacity: time allocation. A traffic signal essentially allocates time among conflicting traffic movements seeking use of the same physical space. The way in which time is allocated has a significant impact on the operation of the intersection and on the capacity of the intersection and its approaches.

Level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (i.e., in the absence of traffic control, geometric delay, any incidents, and any other vehicles). Specifically, level of service criteria for traffic signals is stated in terms of average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the ratio of green time to cycle length and the volume-to-capacity ratio for the lane group.

For each intersection analyzed, the average control delay per vehicle per approach is determined for the peak hour. A weighted average of control delay per vehicle is then determined for the intersection. A level of service designation is given to the control delay to better describe the level of operation. Descriptions of levels of service for signalized intersections can be found in **Table A-2**.

TRAFFIC AND TRANSPORTATION Table A-2
Description of Level of Service for Signalized Intersections

Level of Service	Description
A	Very low control delay, up to 10 seconds per vehicle. Movement forward (progression) is extremely favorable, and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	Control delay greater than 10 and up to 20 seconds per vehicle. There is good progression or short cycle lengths or both. More vehicles stop causing higher levels of delay.
C	Control delay greater than 20 and up to 35 seconds per vehicle. Higher delays are caused by fair progression or longer cycle lengths or both. Individual cycle failures may begin to appear. Cycle failure occurs when a given green phase does not serve a waiting line of vehicles, and overflow occurs. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.
D	Control delay greater than 35 and up to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volumes. Many vehicles stop, the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Control delay greater than 55 and up to 80 seconds per vehicle. The limit of acceptable delay. High delays usually indicate poor progression, long cycle lengths, and high volumes. Individual cycle failures are frequent.
F	Control delay in excess of 80 seconds per vehicle. Unacceptable to most drivers. Oversaturation and arrival flow rates exceed the capacity of the intersection. Many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to higher delay.
Source: *Highway Capacity Manual 2000*	

The use of control delay, often referred to as signal delay, was introduced in the 1997 update to the *Highway Capacity Manual*. It represents a departure from previous updates. In the third edition of the *Highway Capacity Manual*, published in 1985 and the 1994 update to the third edition, delay only included stop delay. Thus, the level of service criteria listed in Table B differs from earlier criteria.

Unsignalized Intersections

The current procedures on unsignalized intersections were first introduced in the 1997 update to the *Highway Capacity Manual* and represent a revision of the methodology published in the 1994 update to the 1985 *Highway Capacity Manual*. The revised procedures use control delay as a measure of effectiveness to determine level of service. Delay is a measure of driver discomfort, frustration, fuel consumption, and

increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (i.e., in the absence of traffic control, geometric delay, any incidents, and any other vehicles). Control delay is the increased time of travel for a vehicle approaching and passing through an unsignalized intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection.

Two-Way Stop Controlled Intersections

Two-way stop controlled intersections in which stop signs are used to assign the right-of-way, are the most prevalent type of intersection in the United States. At two-way stop-controlled intersections, the stop-controlled approaches are referred as the minor street approaches and can be either public streets or private driveways. The approaches that are not controlled by stop signs are referred to as the major street approaches.

The capacity of movements subject to delay is determined using the "critical gap" method of capacity analysis. Expected average control delay based on movement volume and movement capacity is calculated. A level of service designation is given to the expected control delay for each minor movement. Level of service is not defined for the intersection as a whole. Control delay is the increased time of travel for a vehicle approaching and passing through an all-way, stop-controlled intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection. A description of levels of service for two-way stop-controlled intersections is found in **Table A-3**.

TRAFFIC AND TRANSPORTATION Table A-3
Description of Level of Service for Two-Way Stop Controlled Intersections

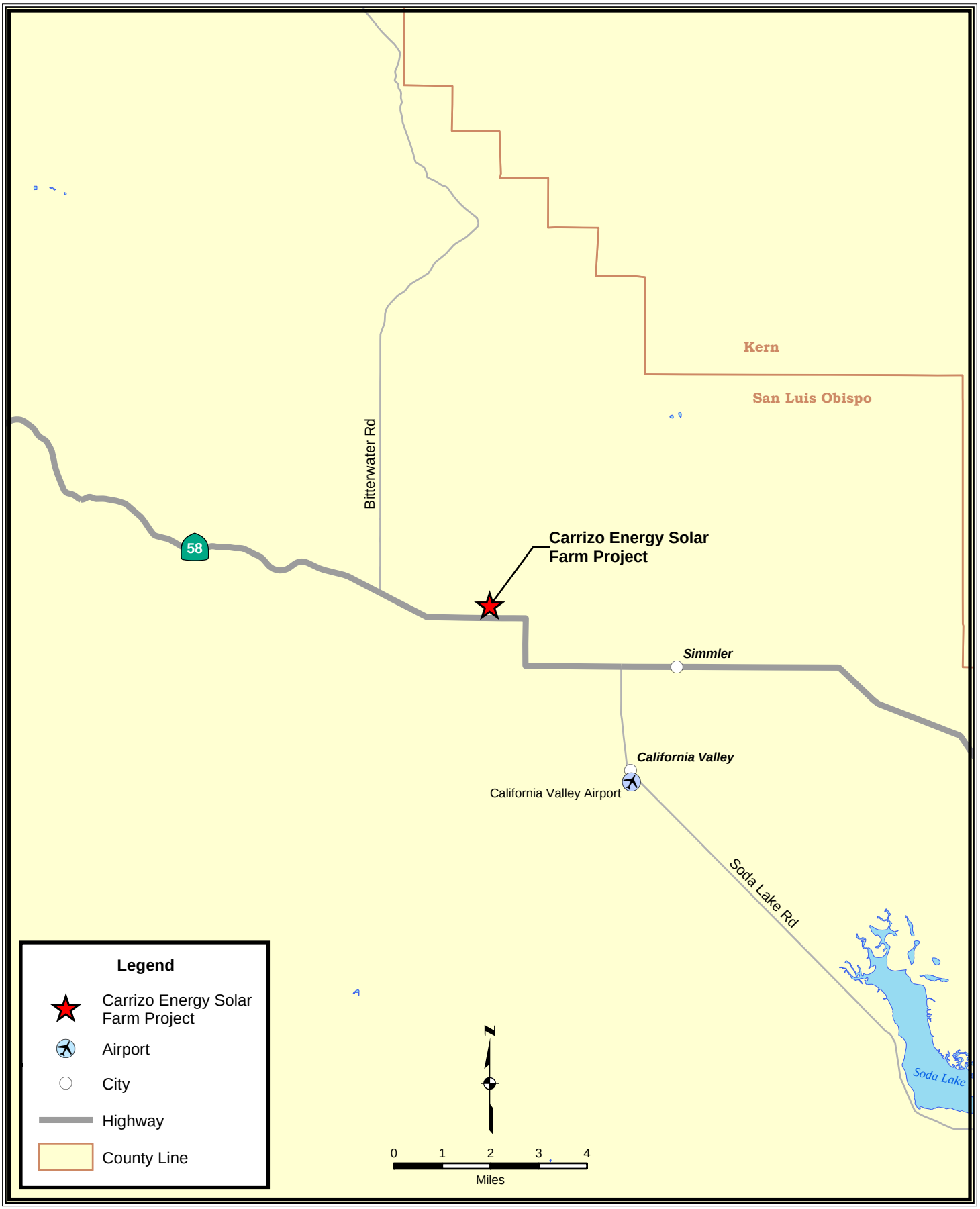
Level of Service	Description
A	Very low control delay less than 10 seconds per vehicle for each movement subject to delay.
B	Low control delay greater than 10 and up to 15 seconds per vehicle for each movement subject to delay.
C	Acceptable control delay greater than 15 and up to 25 seconds per vehicle for each movement subject to delay.
D	Tolerable control delay greater than 25 and up to 35 seconds per vehicle for each movement subject to delay.
E	Limit of acceptable control delay greater than 35 and up to 50 seconds per vehicle for each movement subject to delay.
F	Unacceptable control delay in excess of 50 seconds per vehicle for each movement subject to delay.
Source: *Highway Capacity Manual 2000*	

REFERENCE

Transportation Research Board. Highway Capacity Manual 2000. Washington, D.C.

TRAFFIC & TRANSPORTATION - FIGURE 1

Carrizo Energy Solar Farm Project - Regional Transportation System

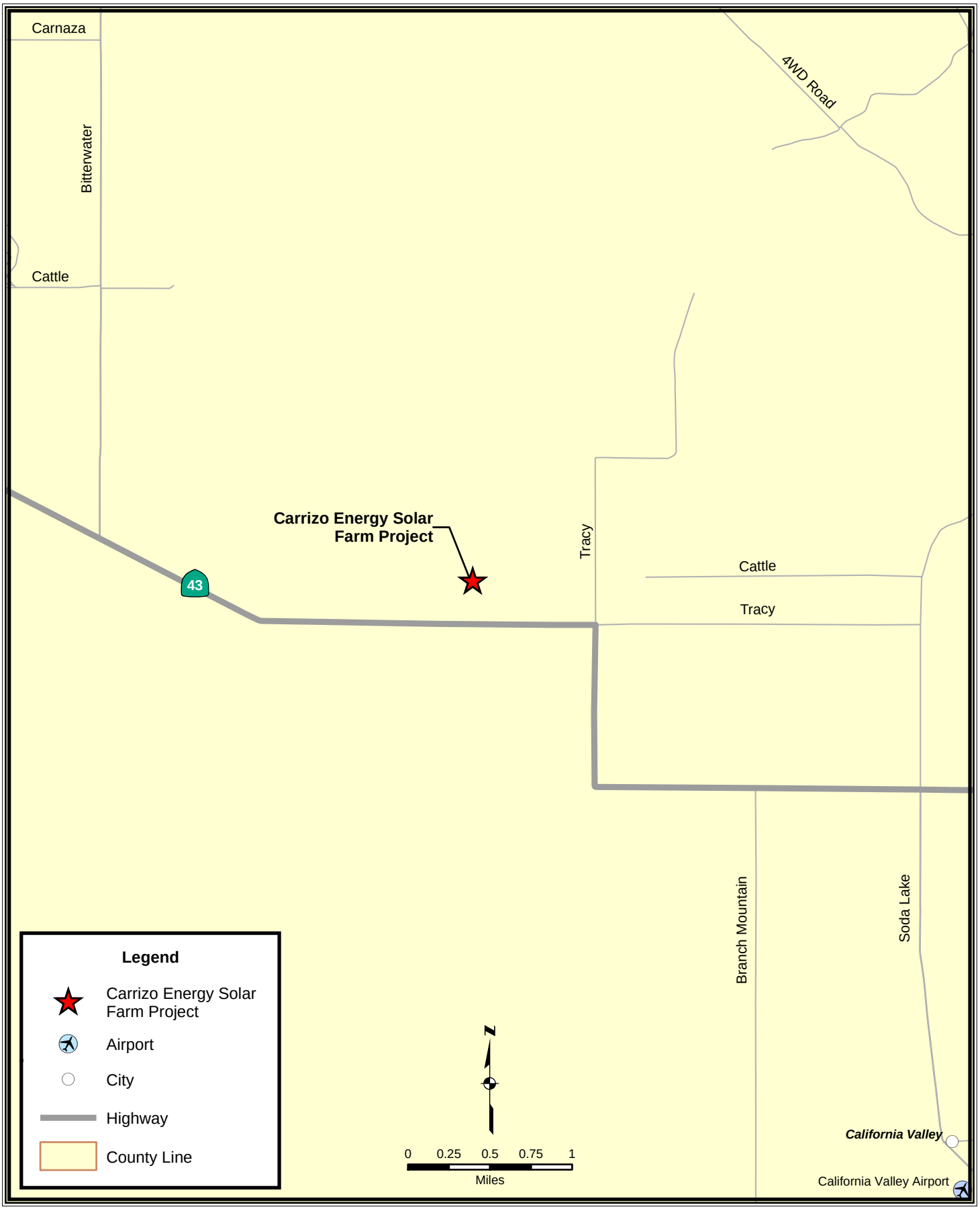


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: California Energy Commission - Tele Atlas

TRAFFIC & TRANSPORTATION - FIGURE 2

Carrizo Energy Solar Farm Project - Local Transportation System



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: California Energy Commission - Tele Atlas

TRANSMISSION LINE SAFETY AND NUISANCE

Obed Odoemelam, Ph.D.

SUMMARY OF CONCLUSIONS

The applicant, Carrizo Energy, LLC, proposes to transmit the power from the proposed Carrizo Energy Solar Farm project (CESF) to the Pacific Gas and Electric (PG&E) transmission grid through a new on-site, single-circuit, 230-Kilovolt (kV) overhead line extending from the CESF Switchyard to a connection point at the new PG&E switching station that would reside in the CESF Power Block. It is from this new switching station that the generated power would be transmitted to the grid using the existing PG&E Morro Bay-Midway 230-kV transmission line # 1 to the immediate north. This 850-foot connecting line would be located within the CESF property boundaries except for a 90-foot segment that would extend beyond the site to the Morro Bay-Midway line. Since the proposed line would be located away from area residences, there would be no potential for residential electric and magnetic field exposures that have raised concern about human health effects in recent years. The proposed line would be operated in the PG&E service area and therefore, its design, erection, and maintenance plan would be according to standard PG&E practices, which conform to applicable laws, ordinances, regulations and standards (LORS). With the five proposed conditions of certification, any line-related safety and nuisance impacts would be less than significant.

INTRODUCTION

The purpose of this analysis is to assess the proposed line design and operational plan to determine whether its related field and nonfield impacts would constitute a significant environmental hazard in the area around the proposed route. All related health and safety LORS are currently aimed at minimizing such hazards. Staff's analysis 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.

The following federal, state, and local laws and policies apply to the control of the field and non-field impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) TABLE 1
Laws, Ordinances, Regulations and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, " Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, Section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
Noise Element of San Luis Obispo County's General Plant.	Sets noise limits for stationary noise sources.
San Luis Obispo County's Noise Standard	Sets sound level limits at residences and outdoor activity areas.
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.

Applicable LORS	Description
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.

SETTING

According to the applicant (CESF 2007a, pp. 1-2, 1-3, 1-4 3-1 3-2, and 5.13-1), the site for the proposed project is a 640-acre fenced-in parcel adjacent to California State Route 58 in San Luis Obispo County and approximately 5.0 miles west of Kern County. The area is zoned for agricultural use and electricity generation is allowable use. The area is thus traversed by several PG&E lines included a 115-kV line and the 230-kV Morro Bay-Midway line to which the proposed line would be connected. The line would be 850 feet long and located within the facility's fenced-in property boundaries except for a 90-foot segment that would extend from the new PG&E switching station within the CESF site to the PG&E 230-kV Morro Bay-Midway # 1 line to the north. The absence of residences in the immediate vicinity means that there would be no long-term residential exposures to the generated electric and magnetic fields.

PROJECT DESCRIPTION

According to the information from the applicant (CESF 2007a, pp. 3-9, 3-10, 3-26 and 3-27), the proposed project transmission line will consist of the segments listed below:

- An 850-foot ,double-circuit overhead 230-kV line connecting CESF's switchyard to PG&E's switching station, all located within the CESF Power Block ; and
- A 90-foot long, single-circuit, 230 kV overhead line looping into and from the new PG&E switching station on the CESF site to tie into the 230-kV Morro Bay-Midway line.

The proposed line conductors would extend from two starting-off support structures at the switchyard and be supported on five Type A, 115-foot steel poles. Since the line would be connected to the power grid of the area's main service utility (PG&E), its conductors would be standard low-corona aluminum steel reinforced cables typical of such PGE lines. The applied design and construction would be in keeping with PG&E's guidelines that ensure line safety and efficiency together with reliability, and maintainability.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed LORS. These LORS 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.

DIRECT IMPACTS AND MITIGATION

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace and the need to file a "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA as noted in the LORS section. The need for such a notice depends on factors related to the height of the structure, the slope of an imaginary surface from the end of nearby runways to the top of the structure, and the length of the runway involved.

Since (a) the proposed line supports would at 100 feet be much less than the 200 feet that triggers FAA's concern about aviation safety and (b) there are no airports or heliports near enough for the line to extend into the restricted air space, (CESF 2007a, p. 3-41), the proposed line structures do not pose an obstruction-related aviation hazard to area aircraft as defined using current FAA criteria.

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 line would be built and maintained in keeping with standard PG&E practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345-kV and above, and not for 230-kV lines such as the proposed line. The proposed low-corona designs are used for all PG&E lines of similar voltage rating to reduce surface-field strengths and the related potential for corona effects. Staff does not expect any corona-related radio-frequency interference or related complaints in the general project area with no residences. However, staff recommends Condition of Certification **TLSN-2** which requires mitigation in the unlikely event of complaints. Because the cause of complaints is difficult to predict, it is not possible to specify specific mitigation measures. However, a range of mitigation measures is available to address different causes of line-induced interference with radio communication

Audible Noise

As with radio noise, audible noise is limited through design, construction or maintenance practices established from industry research and experience. These practices are effective without creating 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 can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345-kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345-kV as proposed project line. Research by the Electric Power Research Institute (EPRI 1982) has validated this for lines of all voltage classes by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more. Since the low-corona designs that would be used for this line would also minimize field strengths, 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** 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 PG&E lines would be implemented for the proposed project line (CESF 2007a pp. 3-41 and 3-42). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Moreover, the line would traverse an agricultural area with no trees of sufficient size to pose a contact-related fire hazard. Condition of Certification **TLSN-4** 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 (CESF 2007a pp. 3-41 and 3-42) 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 (CESF 2007a, p.3-42). Staff recommends Condition of Certification **TLSN-5** to ensure such grounding.

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, hence the general practice of describing exposure to them together as EMF exposure. The CPUC, other regulatory agencies, and staff, have evaluated the available evidence and concluded that it does not support the conclusion 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 understanding 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 reduction of such fields as feasible 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

In California, the CPUC (which regulates the installation and operation of investor-owned high-voltage lines) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields below 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 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 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 effect of such applications would be reflected by ground-level field strengths 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 each new line in California is currently required by the CPUC to be designed according to the EMF-reducing guidelines of the electric utility in the service area involved, its 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 PG&E 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 identify a need for significant changes to existing field management policies. Since there would be no long-term residential field exposures along the proposed route as previously noted, there would not be the types of health concern that has been expressed about such exposures in recent years. The only project-related EMF exposures of potential significance are the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the immediate vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

Industrial Standards

As with similar PG&E lines, specific field strength-reducing measures would be incorporated into the design of the proposed line 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.

The potential lack of residential field exposure from the proposed line's operation means that the only project-related exposure of potential significance is the short-term exposure of workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the immediate vicinity of the line. These types of exposures are short-term and well understood as not significantly related to the health concern.

Since the intensity of the line's fields would reflect the effectiveness of the effectiveness of PG&E's field-reducing designs to be applied, their calculated or measured values could be used for comparison with fields of similar PG&E lines. It is the similarity between the fields from such existing lines and any new lines that constitutes the previously noted compliance with present CPUC policy on line field management. Staff recommends Condition of Certification, **TLSN-3** for field measurements (at representative points along the proposed route) for the necessary comparison. These field strength values would reflect both the effectiveness of the applied field-reducing measures (and the need for further mitigation), and the potential contribution of CESF to area EMF levels.

CUMULATIVE IMPACTS AND MITIGATION

Since the proposed project transmission line and switchyard would be designed according to applicable field-reducing PGE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for PG&E 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-3**.

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 PG&E. Since the proposed project line and related switchyard would be designed according to the respective requirements of GO-95, GO-52, GO-131-D, and Title 8, Section 2700 et seq. of the California Code of Regulations, and operated and maintained according to current PG&E guidelines on line safety and field strength management, staff considers the presented design and operational plan to be in compliance with the health and safety LORS 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-3**.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no public or agency comments on the transmission line nuisance and safety aspects of the proposed Carrizo Energy Solar Farm.

CONCLUSIONS

Since the proposed transmission line does not pose an aviation hazard according to current FAA criteria, staff does not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures to be implemented in keeping with current PG&E 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 and related complaints especially along the proposed route with no nearby residences. The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of PUC's General Order 95. Compliance with Title 14, California Code of Regulations, Section 1250, will 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 proposed route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed Carrizo Energy Solar Farm 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 PG&E 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 located along a route without nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws. With the conditions of certification proposed below, any such impacts would be less than significant.

PROPOSED CONDITIONS OF CERTIFICATION

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 Pacific Gas and Electric's EMF-reduction guidelines.

Verification: At least thirty days before starting construction of 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 ensure that every reasonable effort will be made to identify and correct, on a case-specific basis, any complaints of interference with radio or television signals from operation of the project-related lines and associated switchyards.

Verification: All reports of line-related complaints shall be summarized for the project-related lines and included during the first five years of plant operation in the Annual Compliance Report.

TLSN-3 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 proposed route. 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 not later than six 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-4 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 five years of 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-5 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.

REFERENCES

CESF 2007a. Application for Certification of the Carrizo Energy Solar Farm Project, Volumes I and II submitted to the California Energy Commission on October 25, 2007.

Electric Power Research Institute (EPRI) 1982. Transmission Line Reference Book: 345 kV and Above.

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.

VISUAL RESOURCES

Mark R. Hamblin

SUMMARY OF CONCLUSIONS

The CESF, a proposed thermal solar project covering 640 acres, is the first project of its kind that Energy Commission visual resource staff has had to evaluate for visual impacts. The size of the project, in the setting of the sparsely populated area where it is proposed, presents staff with complex aesthetic issues related to the transformation of northern Carrizo Plain by this project, as well as by the cumulative impact of nearby renewable energy facilities. Thus, there is a potential that the project may have a substantial negative effect on the environment of persons in general, including public and private views and other features of beauty. At this time staff is unable to form final conclusions whether the operation of the Carrizo Energy Solar Project as proposed would create and aesthetic impact under the California Environmental Quality Act (CEQA) and Guidelines or whether the project would be consistent with applicable laws, ordinances, regulations and standards (LORS) pertaining to aesthetics and the preservation and protection of sensitive visual resources.

To ensure that an appropriate analysis is conducted for this project, staff is taking time between the Preliminary and Final Staff Assessments to incorporate additional information and consider its' impact upon the visual integrity of the area. Yet to be considered is additional information related to the construction laydown area, landscaping, a review of the glint and glare study and cumulative impacts. Conclusions on the project's CEQA visual impact significance and LORS compliance will be provided in the Final Staff Assessment.

INTRODUCTION

Visual resources are the viewable natural and man-made features of the environment. In this section, staff evaluates the proposed project's construction and operation. Staff uses the criteria in the "Aesthetic" section of Appendix G in the California Environmental Quality Act (CEQA) Guidelines to determine if the project would introduce a significant impact under CEQA. Staff also determines whether the project would comply with applicable laws, ordinances, regulations, and standards (LORS) pertaining to aesthetics, or preservation and protection of sensitive visual resources.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Visual Resources Table 1 provides a general description of identified adopted federal, state, and local LORS pertaining to aesthetics, or preservation and protection of sensitive visual resources relevant to the proposed project.

VISUAL RESOURCES Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	

Transportation Equity Act for the 21st Century of 1998, and Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2005	The project site does not involve federal managed lands, nor a recognized National Scenic Byway or All-American Road within its vicinity.
State	
California Streets and Highways Code, Sections 260 through 263 – Scenic Highways	Ensures the protection of highway corridors that reflect the State's natural scenic beauty.
Local	
San Luis Obispo County General Plan	
Agriculture & Open Space Element (Resolution No. 98-495, adopted December 15, 1998, revised January 2007)	Identifies those areas of the county with productive farms, ranches and soils. Provides establish goals, policies and implementation measures that will enable their long-term stability and productivity. Also, identifies open space lands that are worthy of protection for their intrinsic value, and provides goals, policies and implementation measures that will enable their long-term protection.
Shandon-Carrizo Area Plan, Land Use and Circulation Elements, (Resolution 80-350, adopted September 22, 1980, revised January 1, 2003)	Describes county land use, circulation and public services policies for the Shandon-Carrizo planning area.
San Luis Obispo County Code, Title 22, Land Use Ordinance	
Chapter 22.10 General Property Development and Operating Standards:	
Section 22.10.060 Exterior Lighting	Provides standards applicable to all outdoor night-lighting sources, except for street lights within public rights-of-way and all uses established in the “Agriculture” land use category.
Section 22.10.080 Fencing and Screening	Provides standards for fencing and screening to protect certain uses from intrusion, to protect the public from uses that may be hazardous, and to increase compatibility between different land uses by visual screening.
Section 22.10.090 Height Measurement and Height Limit Exceptions	Provides limits on the height of structures as needed to support public safety, protect access to natural light, ventilation, support preservation of neighborhood character, and to preserve viewsheds and scenic vistas.

Section 22.10.140 Setbacks Section 22.10.160 Underground Utilities Section 22.16.020 Applicability of Landscaping Standards Section 22.20.010 Sign Ordinance Section 22.30.360 Pipelines and Transmission Lines	Provides the minimum setbacks for buildings. Utilities to serve new structures are to be installed underground rather than by use of poles and overhead lines. Provides landscaping standards. Provides sign requirements. Provides standards for pipeline, power and communication transmission lines.
Chapter 22.32 Electric Generating Plants - Section 22.32.030 Development Standards	Provides development standards for electric generating plants.
Chapter 22.110 Shandon-Carrizo Planning Area - Section 22.110.202 Rural Area Standards	Provides standards for proposed development within and outside of urban and village reserves within the Shandon-Carrizo planning area.

REGIONAL SETTING

The proposed Carrizo Energy Solar Farm (CESF) project would be built in the northern portion of the Carrizo Plain, approximately five miles northwest of the settlement of California Valley in San Luis Obispo County, California (**Visual Resources Figure 1** – Aerial View of Carrizo Energy Solar Farm Site and Vicinity).

The Carrizo Plain is approximately 15 miles wide and 50 miles long, surrounded by mountains. To the east of the Carrizo Plain are the Temblor Range (3,000 – 4,500 feet elevation) and the San Andreas Fault. To the west are the La Panza Range (elevation 2,385 feet) and Caliente Range (3,000-5,000 feet elevation). The Los Padres National Forest is in the distant southwest.

The Carrizo Plain consists of grassland, rangeland, desert, and rugged chaparral-covered terrain. Irrigated vineyard and alfalfa occurs in the north end of the plain. These lands are generally large ownership acreages used for grazing and watershed. Much of the land is owned by the federal government through the U.S. Bureau of Land Management.

On the plain is the Carrizo Plain National Monument. It's a 250,000 acre area noted for its geologic features which include the San Andreas Fault and Soda Lake, archeological sites and wildlife. The monument is the largest remaining remnant of original San Joaquin Valley habitat.

California Valley, the closest community to the proposed project site, is an undeveloped settlement encompassing 24,083 acres. It came into being in l960, when part of the El

Chicote Ranch was subdivided into more than 7,200 2.5-acre "ranchos" and sold through nationwide advertising as "the geographic center of this spectacular California growth area with unbounded future." This proposed new town has never developed (COSLO2003).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act defines 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).

To determine whether there is a potentially significant visual resources impact generated by a project, Energy Commission staff reviews the project using the CEQA Guidelines Appendix G Environmental Checklist pertaining to “Aesthetics”. The checklist questions include the following:

A. Would the project have a substantial adverse effect on a scenic vista?

B. Would the project substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

DIRECT/INDIRECT IMPACTS AND MITIGATION

The impact discussion is presented under the following CEQA headings: scenic vista, scenic resources, visual character or quality, and light or glare.

A. SCENIC VISTA

“Would the project have a substantial adverse effect on a scenic vista?”

A scenic vista for the purpose of this analysis is defined as a distant view through and along a corridor or opening that exhibits a high degree of pictorial quality. Staff has not identified a defined scenic vista in the project viewshed.

B. SCENIC RESOURCES

“Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway corridor?”

A scenic resource for the purpose of this analysis includes a unique water feature (waterfall, transitional water, part of a stream or river, estuary); a unique physical geological terrain feature (rock masses, outcroppings, layers or spires); a tree having a

unique visual/historical importance to a community (a tree linked to a famous event or person, an ancient old growth tree); historic building; or a designated federal scenic byway or state scenic highway corridor.

Staff is evaluating the impact of the proposed CESF on a unique resource such as the northern Carrizo Plain. The conclusion will be provided in the Final Staff Assessment.

Energy Commission cultural staff assessed the cultural landscape and found the subdivision of large farm parcels along paved roads and the alterations at many of the farms have compromised the integrity of the landscape, making it not eligible for the California Register. For a more detailed discussion regarding the cultural landscape, see the **Cultural Resources** section of this Preliminary Staff Assessment (PSA).

Hubbard Hill and Freeborn Mountain are approximately four and half miles to the south of the project site. They have been identified as a sensitive resource area and designated as open space by the county to emphasize protection of the area in its natural state and use for passive recreation activities only. No specific plans for use of the area have been formulated except potential acquisition of some of the area by the state (COSLO2003). Hubbard Hill and Freeborn Mountain are visible from the CESF site.

Currently there are two officially designated state scenic highways in San Luis Obispo County (Caltrans2007). Highway 1 between the city of San Luis Obispo and the Monterey County line, and Nacimiento Lake Drive (County G-14). State Route 58 is not listed by California Department of Transportation (Caltrans) as a state scenic highway. The County of San Luis Obispo has not designated SR-58 a county scenic highway.

The Carrizo Plain National Monument (National Monument) is approximately 10 miles to the southeast. The National Monument is not visible from the CESF site.

C. VISUAL CHARACTER OR QUALITY

"Would the project substantially degrade the existing visual character or quality of the site and its surroundings?"

PROJECT SITE

The proposed 640-acre project site to be used for the CESF is a low-lying dry grass covered area that has an inactive farm complex and fencing to control movement of animals and public access (**Visual Resources Figure 2** – Aerial View of Project Site, and **Visual Resources Figure 3** - Existing View of the Project Site).

The CESF would use approximately one hundred and ninety-five, compact linear fresnel reflector solar concentrating lines, and associated steam drums, steam turbine generators, air cooled condensers, and infrastructure, producing up to a nominal 177 megawatts. The proposed CESF's most publicly visible structures have been identified in **Visual Resources Table 2**. (**Visual Resources Figure 4** – Aerial Simulation of Carrizo Energy Solar Farm at Completion and **Visual Resources Figure 5** – Solar Field Layout Carrizo Energy Solar Farm).

VISUAL RESOURCES Table 2
Summary of Major Publicly Visible Structures

Project Component	Number of Units	Length, Width, Diameter (approximately)	Height (approximately)	Color and Materials
Transmission Line Steel Pole at 230kV Connection	2	8-foot diameter	150 feet	corrugated steel
Air Cooled Condenser	2	250-foot x 220-foot (20-cell)	115 feet	corrugated steel, natural shades of beige and brown
Transmission Line Steel Pole, In-Line	4	8-foot diameter	100 feet	corrugated steel
Steam Turbine Generator Enclosure	2	200-foot x 50-foot	60 feet	corrugated steel, natural shades of beige and brown
Steam Drum and Support Structure	8	40-foot x 15-foot 12-foot diameter	58 feet	corrugated steel, natural shades of beige and brown
Receiver	4680	2-foot x 2-foot	56 feet	corrugated steel
Take-off, Dead-end and Bus Structures	4	35-foot x 30-foot	40 feet	corrugated steel
Source: CESF2007a, pg. 3-6 and pg. 5.13-18, and CESF2008h, pg.1-1 and Figure No. 1.4-1				

PROJECT VIEWSHED

The project owner has prepared a Visual Sphere of Influence (VSOI) for the project. The VSOI represents the area within which the project could be seen and potentially result in a significant impact. The VSOI is shown on **Visual Resources Figure 6**.

The VSOI takes into account the visibility of the proposed project's most publicly visible structures on the project site (i.e., air cooled condenser), existing development (e.g., PG&E Carrizo Plain Substation), and other variables affecting potential visibility of the project that include: orientation of the viewer, duration of view, atmospheric conditions, lighting (daylight versus nighttime), and visual absorption capability (VAC). VAC is defined as the extent to which the complexity of the landscape can absorb new elements without changing the overall visual character of the area. The furthest distance at which potentially significant visual impacts could occur for the VSOI is five miles. This distance is based upon guidelines established in the United States Forest Service Visual Management System (CESF2007a).

Based on a five-mile distance limit, the VSOI boundary was refined by the applicant to account for local viewing conditions, primarily topographic and vegetative screening. Computer viewshed analyses were conducted using 30-meter-grid cell resolution, generated from 1:24,000 Digital Elevation Model (DEM) data from the United States Geological Survey (USGS) to map the boundaries of the VSOI within the five-mile limit. USGS DEM files were imported into an ArcView 9.2-based geographical information system (GIS) using the spatial analysis extension. The combined DEM was used to run viewshed analyses in Universal Transverse Mercator (UTM), Zone 10, North American Datum 83 (NAD83). For the CESF, the centroid of the 640-acre site was used at six feet above existing grade to run an existing viewshed map. Next, a centroid of the facility

site's tallest structure, the air cooled condenser at a height of 115 feet, as well as the perimeter/fence line for the entire site, was input and the viewshed model was rerun (CESF2007a).

Overall, the CESF site would be highly visible to several nearby residents and roadway users within 0.5 mile (*foreground view*), the Carrisa Plain School and other residences within 1.0 mile (*middleground view*), and locations within the valley and surrounding mountains, most notably Hubbard Hill and Freeborn Mountain 3.5 to 5.0 miles and beyond (*background view*). Beyond the mapped VSOI, the CESF would be either not visible due to topography, natural and/or man-made screening, or of such a small size in the background that it would hardly be noticeable.

Visual Resources Figure 7 provides the location of residences within approximately two miles of project site. Approximately nine residences are within one-mile of the project site. The majority of these residences have direct, unobstructed views of the project site. A number of the homes have landscaping (primarily evergreen trees) that minimizes views toward the project site. Five to six other residences are within two miles of the project site. Several of these residences may have a direct view of the project site. A few of the homes have partially obscured views to the project site due to the presence of adjacent residences in the foreground view and/or existing vegetative screening (CESF2007a.) (**Visual Resources Figure 8** – View of Existing Residences North of Project Site on Tracy Lane) and **Visual Resources Figure 9** – View of Existing Residences West of Project Site along State Route 58). Currently there are no residences to the east of the project site. **Visual Resources Figure 10** – Existing View East of Project Site from Tracy Lane).

Motorists along SR-58 would have views of the CESF site. A motorist would have a direct unobstructed view of the site (i.e., the intersection of SR-58 and Tracy Lane) (**Visual Resources Figure 11** – Existing View from Intersection of SR-58 and Tracy Lane). Traffic counts along SR-58 provided in the AFC, indicate that approximately 350 average daily trips occur on the highway west of Soda Lake Road east of the project.

Distant views from the project site consist mainly of Hubbard Hill-Freeborn Mountain and the La Panza Range to the west, hills within the Carrizo Plain National Monument to the southeast, and the Temblor Range to the east. These surrounding areas offer a variety of recreational opportunities; however, there are no identified recreational trails within five miles of the project site. Hubbard Hill and Freeborn Mountain block views of the project site from Los Padres National Forest. The Carrizo Plain National Monument is not within the VSOI.

Key Observation Point Viewshed Evaluation

A "Key Observation Point" (KOP) is selected to be representative of the most critical viewsheds from off-site locations where the project would be visible to the public — for example; recreational and residential areas, travel routes, bodies of water, as well as scenic and historic resources. 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 a

primary viewer group(s) that would potentially be affected by the project. Staff participates with the applicant in the selection of KOPs.

Staff evaluates the existing physical environmental setting, the KOP, and the visual change created by the proposed project to the viewshed.

The applicant has provided KOP photographs that show the existing physical condition without the project, and has prepared photographic simulations to show how the proposed project would appear in the existing condition. **Visual Resources Figure 6** shows the locations of the four KOPs used for this analysis:

- KOP 1 – Front Yard of Closest Residence North of Project Site Looking South;
- KOP 2 – Front Yard of Closest Residence West of Project Site Looking East;
- KOP 3 – Intersection of State Route 58 and Tracy Lane Looking West, and;
- KOP 4 – State Route 58, West of Bitterwater Road Looking East.

Staff has provided in Appendix VR-1 a list of visual related terms defined by staff that has been used in the KOP analysis.

KOP 1 – Front Yard of Closest Residence North of Project Site Looking South

Visual Resources Figure 12 represents the existing view toward the project site from the front yard area of a single family residence approximately 0.3-mile north of the CESF project site along Tracy Lane. The KOP view represents the closest of three single family residences to the north of the project site (**Visual Resources Figure 13** – Landscape Character View - Closest Residence North of Project Site from Tracy Lane and Panoramic of La Panza Range).

Visual Sensitivity

The foreground view consists largely of grassland. The viewshed has been modified by human involvement with the presence of two 150-foot tall steel transmission lattice towers, property fencing, and dilapidated farm structures in the foreground and mid-ground views. The view offers little or no variety, or contrast in vegetation. The color may vary during spring months. Unique forms are created by the mountains in the background. The mountains are approximately five miles south of the KOP 1 location. Typically, a view of a ridgeline zero to five miles away is considered to be sensitive to a viewer. From this KOP, the viewer would be accustomed to a view of the mountains, specifically the ridgeline. The ridgeline is distinct in form. The mountains do not have a focal point that draws the viewer's eye to a feature (e.g., rock outcropping).

Residential viewers in general are considered to have a higher level of viewer concern, due to a concern for protecting their place of residence and a long duration of viewing time. From this KOP, the viewer would experience an unobstructed view of the project site (high visibility). The viewer would have an extended duration view of the project site.

Visual Change

Visual Resources Figure 14 presents a simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 1 viewshed.

As shown, the notable publicly visible structures in the view are the 58-foot tall corrugated steel receivers and steam drums, surface treated with beige and brown colors. The CESF owner does not propose perimeter landscaping for the project site.

The degree of contrast (form, line, color, and texture) introduced by project's structures would be moderate, meaning the element contrast begins to attract attention and begins to dominate the characteristic landscape. The project's vertical elements would have a noticeable pattern within the backdrop of the mountains.

The simulation shows that the proportionate size relationship of project structures to other existing man-made and natural components would occupy a medium portion of the total field-of-view (visual dominance) in KOP 1. The project structures would be a co-dominate feature in the view.

Project structures would block a portion of the view of the distant mountains in the KOP 1 viewshed.

KOP 2 – Front Yard of Closest Residence West of Project Site Looking East

Visual Resources Figure 15 represents the existing view toward the project site from the side yard area of a single family residence along SR-58, approximately 0.2-mile west of the CESF site. The KOP view represents the closest of at least 12 residences scattered west of the project site (**Visual Resources Figure 16** – Landscape Character View - Closest Residence West of Project Site from State Route 58 and Panoramic of Temblor Range).

Visual Sensitivity

The existing view includes a relatively flat expanse of grassland with a background view of mountains (Temblor Range elevation 3,850 feet) approximately 4 miles east. The viewshed has been modified by the presence of a line of wood utility poles and property fencing in the mid-ground view. The view has little or no variety, or contrast in vegetation. Color may vary during spring months. From this KOP, the viewer would be accustomed to a view of the mountains and the ridgeline. The mountains do not have a focal point that draws the viewer's eye to a feature. However, the ridgeline is distinct in form, within five miles of the project site, and considered sensitive to a viewer.

Residents live in an area that specifically appeals to those who wish to live in a remote rural setting. As previously noted, residential viewers have a higher level of viewer concern, due to a concern for protecting their place of residence and a long duration of viewing time.

From this KOP, the viewer would experience an unobstructed view of the project site and the project would be highly visibility. The viewer would also have an extended duration view of the project site.

Visual Change

Visual Resources Figure 17 presents a simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 2 viewshed.

As shown, the notable publicly visible structures in the view are the 58-foot tall corrugated steel receivers' surface treated with beige and brown colors.

The degree of contrast introduced by the project's publicly visible structures would be high; meaning the element of contrast would demand attention, would not be overlooked and would be dominant in the landscape from this KOP. The project's vertical elements would have a noticeable pattern within the backdrop of the mountains.

The simulation shows that the proportionate size relationship of project structures to other existing man-made and natural components would occupy a large portion of the total field-of-view of KOP 2. The structures as simulated would be a dominant feature in the view. A portion of the project would block an existing view of grassland, the Temblor Range, and skyline.

<u>Project Owner Proposed Offsite Landscaping</u>

The CESF owner does not propose perimeter landscaping for the project site. The project owner has identified offsite locations on neighboring properties for possible planting of landscaping to screen the project from their residence. It is the project owner's intent that they would prepare a written agreement with individual landowners who are interested in having landscaping. The project owner states they will work with land owners to provide landscaping that would reduce the CSEF's potential visual impact (CESF2007d).The project owner has contacted a number of land owners.

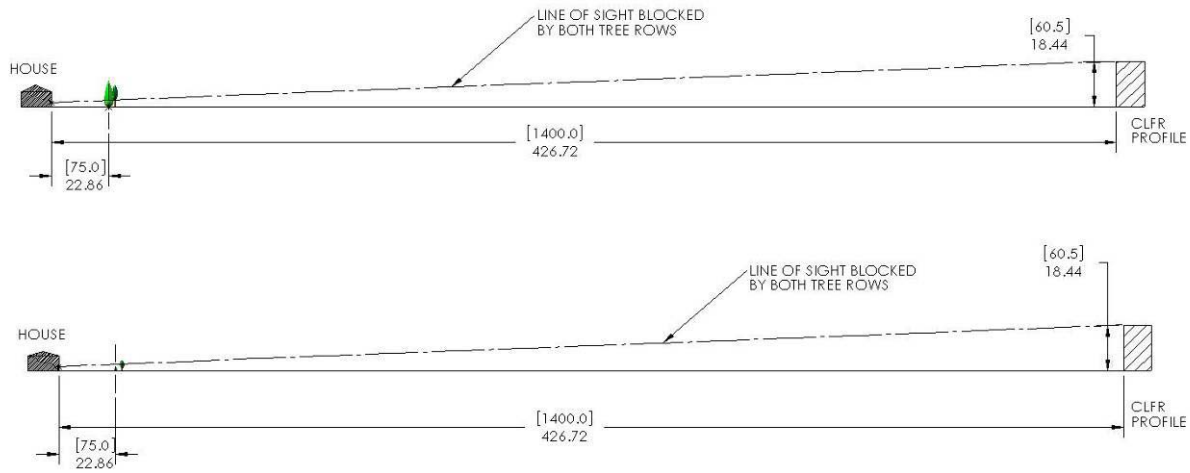
The project owner has offered the planting of two species of evergreen tree. Evergreens have two advantages: they provide coverage year round, and are drought tolerant, enabling them to handle the arid climate on the Carrizo Plain. The CESF project would be screened by a row of Leyland Cypresses spaced eight feet apart, and a second row of California Junipers, eight feet behind the first row, which would be spaced 16 feet apart and staggered so as to be aligned with the gaps between the Cypresses. The row of Junipers would be on the resident's side, and the row of Cypresses would be on the project side. Both rows would be planted simultaneously (CESF2007d).

Leyland Cypress grow fast. Most are planted as quick screening. They could reach 15-20 feet within 5 years have gray green colored foliage and a narrow pyramidal form. This tree accepts a wide variety of soil and climate, average water, and strong winds (Sunset1979, pg. 262).

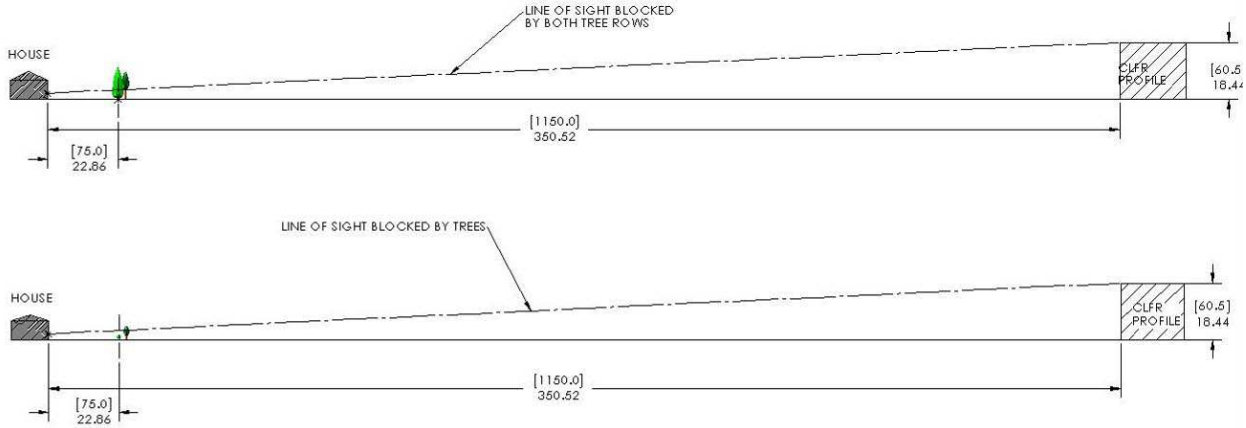
The California Juniper is a native species to the Carrizo Plain. Though the California Juniper grows more slowly than the Leyland Cypress, approximately 6 feet in 5 years, they will eventually reach 30-40 feet in height. Junipers thrive on little or no summer water – except in the hottest interior or desert areas, once they are established. In summer-cool climates they are best grown in full sun but will accept light shade. In hot areas they do well with partial shade. They have yellowish to rich green foliage and

succeed in every soil type the West offers, acid or alkaline, heavy or light (Sunset1979, pg. 339).

The project owner provided line-of-sight diagrams that depict the conceptual landscape screening effectiveness from the closest residences to the north and the west from the project site at five years of growth. The effectiveness of the conceptual landscape was analyzed by the applicant constructing scale drawings showing the line-of-sight for an observer, with their eyes 6' high, standing facing the CESF from both of the closest residences to the project (see below). The row of Juniper trees closest to each residence was modeled assuming 75 feet distance between the trees and the residence. The maximum height of the CESF structure used in the diagram was 60.5 feet. The residence west of the CESF was analyzed as being approximately 1,150 feet away from the project site boundary. The residence north of the CESF was approximately 1,400 feet from the project site boundary (CESF2008a).



Visual Resources Figure 4: Line of site from closest north residence to project. Top is mature landscaping, bottom is at 5 year growth point.



Visual Resources Figure 5: Line of site from closest west residence to project. Top is mature landscaping, bottom is at 5 year growth point.

Using the applicant's assumed criteria of placement of trees 75 feet from the residence and targeting to screen CESF facilities less than 60.5 feet tall, the proposed evergreen tree arrangement at maturity could effectively screen the view of the project site from

nearby residences. However, staff does not agree with the applicant's criteria, and the evergreen screening would also block a portion of the panoramic view of the Temblor Range and skyline currently experienced at the residences. Staff's reasons for disagreement with the applicant's criteria are as follows:

1. The project would include two broad structures taller than 60.5 feet; the two 115-foot high, 250-foot long, 220-foot wide air cooled condensers; and

2. Staff's discussions with at least one property owner (discussion between the KOP 2 property owners (Bells) and Energy Commission Project Manager, John Kessler on August 5, 2008) indicated that their preference for the tree planting would be along their property boundary, so as not to bisect their property, and at a distance of 100's of feet from their residence, much greater than the applicant's assumed 75 feet. In addition, the Bell's have stated a preference for the tree type.

Given this particular resident's preference, and that it may also be the preference of some other residents, the tree line planted along the resident's property boundary would not effectively screen the project. However, the tree line planted on residential properties may still have value in combination with project perimeter tree screening, and together serve to soften the industrial transformation of the 640 acre project site as viewed from the residences and for motorists traveling SR 58 and local roads. Staff also notes the need for the applicant and any residents seeking tree plantings to address the irrigation system design (likely a drip system), financial responsibility and water supply needed to sustain the trees, at least in early years of their development.

KOP 3 – Intersection of State Route 58 and Tracy Lane Looking West

Visual Resources Figure 18 represents the existing view toward the project site from the junction of SR-58 and Tracy Lane looking west along the front of the CESF project site.

Visual Sensitivity

The viewshed has been modified by the presence of SR-58, wooden utility poles and lines, and barbwire fencing in the foreground. Grassland is in the foreground and middleground. In the background are scattered single family residences, accessory structures and trees, Syncline Hill and the La Panza Range.

There is no scenic focal point or unique feature in the viewshed that draws the viewer's eye. SR-58 is not identified as a State Scenic Highway on the California Scenic Highway Mapping System, or as a county scenic highway.

The primary viewer at this KOP would be motorists on SR-58.The roadway design at the project location is a zigzag with a posted speed limited of 15 miles per hour through the turn. The turn also includes the junction of Tracy Lane with SR-58. Motorist would have a long duration view of the project area due to the road design.

From this KOP, the viewer would experience an unobstructed view of the project site. Visibility would be high. According to traffic counts conducted by Caltrans in 2007, the annual average daily traffic (AADT) on SR-58 at Soda Lake Road was 450 vehicles westbound and 350 vehicles eastbound (Caltrans2007b). Using the Soda Lake Road

count (two-miles east of the project site), if at least one individual per vehicle trip were exposed to a view of the project site, the number of exposures would be considered low. Viewers would have a mid-length duration view (20-60 seconds) of the project site through the KOP viewshed.

Visual Change

Visual Resources Figure 19 presents a simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 3 viewshed.

As shown, the notable publicly visible structures in the view are the 58-foot tall corrugated steel receivers' surface treated with beige and brown colors.

The degree of contrast introduced by the project's publicly visible structures would be high; demand attention, would not be overlooked and would be dominant in the KOP view (**Visual Resources Figure 20** - Simulation of Project North of the Intersection of State Route 58 and Tracy Lane. **Visual Resources Figure 21** - Simulation of Project Looking East along State Route 58).

The proportionate size relationship of project structures to other man-made and natural elements would occupy a moderately high portion of the total field-of-view of KOP 3. Project structures would be set back approximately 100 feet from the highway.

KOP 4 – State Route 58 West of Bitterwater Road Looking East

Visual Resources Figure 22 represents the existing view towards the project site along SR-58 from approximately two and a half miles west.

Visual Sensitivity

The primary viewer at this KOP would be a motorist eastbound on SR-58 descending onto the Carrizo Plain from the La Panza Range.

The existing view includes an open expanse of grassland with modifications consisting of scattered rural residences, accessory structures, and transmission line lattice towers in the middleground, and the Temblor Range in the background (approximately 11 miles away). A haze impairs the visual clarity of the Temblor Range. The view has little variety or contrast in vegetation. There is no scenic focal point or unique feature in the viewshed.

The KOP location represents an elevated position that would have a line-of-site view to the project site. Visibility of the project site though unobstructed is softened due to distance from the KOP 4 location.

SR-58 at Soda Lake Road has an AADT of 450 vehicles westbound and 350 vehicles eastbound (Caltrans2007b). Using these vehicle counts for this KOP location, the number of motorist exposures to the project site is considered low. The viewer would be exposed to a mid-length duration view of the project site from this KOP location.

Visual Change

Visual Resources Figure 23 presents a simulation of the proposed project's publicly visible structures after the completion of construction in the KOP 4 viewshed.
From this KOP, the proposed project would introduce an industrial feature to the view. Project features would appear small in the expanse of the Carrizo Plain. The project's two 115-foot tall air cooled condensers would be the most visible features.

The project within the grassland expanse introduces an element of contrast that would be seen, but would not attract attention from this KOP.

The simulation of project structures shows that their proportionate size relationship to other man-made and natural elements would occupy a low portion of the total field-of-view of KOP 4. The structures would be subordinate in the view when compared to other elements.

The Temblor Range is in the background. The amount of view blockage introduced by project structures of grassland and the mountain range at this KOP is considered to be small.

PROJECT LINEARS

An approximate 850-foot long, 230kV transmission line from the CESF would interconnect to the existing PG&E Morro Bay-Midway #1 circuit through the new PG&E 230kV Carrizo Plain Switching Station (**Visual Resources Figure 24** – Simulation of Project's Interconnection). The interconnection would involve the installation of four poles. New transmission poles are to be non-reflective gray colored tubular steel. The transmission poles would be subordinate to other man-made elements in the existing physical setting. The installation of the transmission line is expected to have a low view blockage.

The project's water pipelines are to be installed underground. With the burying of the project's pipelines and restoration of surface areas, the long-term visual impact would be reduced.

PUBLICLY VISIBLE WATER VAPOR PLUMES

The CESF cooling system for heat rejection from the steam cycle will utilize two 115-foot ACCs in order to minimize water use at the CESF. The STGs will exhaust to an exhaust trunk, which carries the steam to the ACCs. Condensed steam is collected in a condensate tank. The air cooled condensers would not emit publicly visible water vapor plumes based on the project design at operation. All auxiliary cooling systems are closed-loop with fin-fan air coolers.

CONSTRUCTION IMPACTS

Construction Laydown Area

A 380-acre construction laydown and parking area is to be developed along the south side of State Route 58 south of the project site (**Visual Resources Figure 25** – Existing Views of the Proposed Construction Laydown Area). The site is a low-lying dry grass covered area that has an inactive farm complex. The farm structures are to be

demolished to allow for the setting of trailers housing temporary construction facilities (offices, restrooms, meal rooms, meeting and conference rooms, etc.) during the construction phase (**Visual Resources Figure 26** – Proposed Construction Laydown Area Site Plan). Also on the site would be assembly and staging areas. Storage for mirrors, steel, and footing construction would occur in the staging areas. The site is to have a chain link fence on the perimeter. The buildings and structures are to remain on the laydown site for approximately three years.

The onsite manufacturing building will require approximately 40,000 square feet of floor space. The foundation would be comprised of 6-inch reinforced concrete flooring. Insulated walls and roofing would be constructed on a modular panel system to allow for rapid erecting and dismantling. Panels would be metal on each side with integral insulation. The building would have large openings on each end (east and west) for the flow of materials (CESF2008h).

A description of the colors and materials of the buildings and structures, a lighting plan, and site screening for the laydown area have not been provided for review by staff at this time.

Construction Activities

Construction activities for the project would occur over an approximate 35-month period; Monday through Friday between the hours of 7:00 am and 7:00 pm. Activities involving refueling equipment, and staging material for construction activities would occur 24 hours a day until completion of project construction.

Site clearing, including demolition of onsite structures, and grading would occur during the first six months of construction. Construction will progress from the northern boundary of the site and move south. Solar mirror blocks are to be prepared in a terraced configuration. The demolition and earth works process would involve use of bulldozers, backhoes, elevating scrapers, hydraulic excavators, tired loaders, compacting rollers, and dump trucks. As the CESF site and laydown area are largely undeveloped, such construction activities would be highly visible to surrounding areas due to the flat, open viewing conditions, and contrast significantly with the existing natural character of the area.

Typically screening of construction site activities, and the laydown and construction parking areas is accomplished by attaching a fabric or adding wooden slats to a perimeter fence. This screening is effective in limiting ground level exposure of a project close to the viewer. Staff believes that the use of fabric or wooden slat screening would provide some surface level visual screening of the construction site and laydown area from SR- 58 viewers.

Staff has proposed Condition of Certification **VIS-1** to formalize construction lighting mitigation measures proposed by the project owner. Lighting that may be required to facilitate nighttime construction activities, to the extent feasible, be consistent with worker safety codes, be directed toward the center of the construction site, shielded to prevent light from straying offsite, and be task-specific because this impact may be significant.

Staff has recommended Condition of Certification **VIS-2** to formalize and ensure restoration of ground surfaces. The project owner proposes the restoration of ground surfaces affected by construction activities. With the effective implementation of surface restoration, project construction activities would not result in a long-term visual degradation to the existing visual condition.

D. LIGHT OR GLARE

"Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?"

The CESF during operation has the potential to introduce offsite light and glare to surrounding properties, and up-lighting to the nighttime sky if typically bright exterior lights were not hooded and lights were not directed onsite.

Light trespass and glare[1] are quite subjective, they are difficult to eliminate, but they can be minimized through good design practices. In many cases, all that is required is the proper placement of poles, selection of luminaire optics, and shielding accessories. The project owner has provided to staff a preliminary operational lighting plan and a glint and glare study for the proposed project. Staff has provided copies of the glint and glare study in **Appendix VR-2,** and the preliminary lighting plan in **Appendix VR-3**. Staff has contacted a consultant (illumination engineer) from outside the California Energy Commission to review the applicant's submitted glint and glare study. The consultant review is expected to be included in the Final Staff Assessment. At this time, staff has not made any recommendations regarding the submitted lighting plan and glint and glare study.

In the July 2008 Supplement to the Carrizo Energy Solar Farm Application for Certification the project owner stated the following regarding the glint and glare study, and the preliminary lighting plan.

> A glint and glare study dated February 26, 2008 was prepared by Ausra CA II, LLC (dba Carrizo Energy, LLC) in response to California Energy Commission Data Request #70. The February glint and glare study was based on the original east/west project configuration identified in the AFC. The February study found that in the east/west configuration, as reflectors move from a stow position into tracking position with light focused on absorber pipes, there is the possibility of a concentrated beam being directed horizontally to the north or south of the CESF boundary or spilling out to the east or west.
>
> The glint and glare study has since been amended to reflect the revised north/south project configuration identified in this supplemental filing and is included as an appendix to this section. With the revised north/south configuration, the potential concentrated beam will now be directed horizontally to the east or west of the CESF boundary or spilling out to the north. There is a possibility of glare affecting pedestrians within 60 feet of the project area to the north, east, and west of the project site. However, the glare would be mitigated

[1] For the purposes of this analysis "direct glare" is used and is defined as the visual discomfort resulting from insufficiently shielded light sources in the field of view.

by the incorporation of privacy slats on perimeter fencing. With incorporation of the privacy slats, impacts from glint and glare on surrounding visual receptors will be mitigated to a less than significant level.

Directly south of the project site is SR-58. Because of the project reconfiguration and according to the amended glint and glare study, it would be virtually impossible to direct beams south towards SR-58. Therefore, changes to glint and glare do not create additional construction or operation related visual impacts beyond those presented in section 5.13.2 of the AFC.

In addition to the revised glint and glare study, a lighting plan was prepared by Ausra CA II, LLC in response to California Energy Commission Data Request #100. This lighting plan was prepared to evaluate potential lighting impacts for the new north/south project configuration, including the new power block arrangement. It was concluded that with mitigation measures in place (e.g., shielded low-impact lighting being used only where necessary for safety or plant security) potential impacts from lighting were found to be either temporary or less than significant. As a result, changes to project lighting do not create additional construction or operation related visual impacts beyond those presented in Section 5.13.2 of the AFC. (CESF2008h)

The applicant has proposed offsite evergreen tree landscaping on nearby properties which at maturity will effectively screen the view of the project site from the residences. The evergreen tree landscaping at maturity would also help block potential light trespass and glint and glare introduced by the project to a residence.

Energy Commission cultural staff spoke with Fred Collins, Tribal Administrator, Northern Chumash Tribal Council regarding the CESF. Mr. Collins indicated that the Carrizo Plain is regarded as a Chumash astrological center. He expressed a concern that light introduced by the project may affect an observer's ability to see the night time sky and view of the horizon (CEC2008s).

CUMULATIVE IMPACTS AND MITIGATION

As defined in Section 15355 of the CEQA Guidelines (California Code of Regulations, Title 14), a cumulative impact is created as a result of the combination of the project under consideration together with other existing or reasonably foreseeable projects causing related impacts. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. In other words, while any one project may not create a significant impact to visual resources, the combination of the new project with all existing or planned projects in an area may create significant impacts. A significant cumulative impact would depend on the degree to which (1) the viewshed is altered; (2) view of a scenic resource is impaired; or (3) visual quality is diminished.

In addition to the 640-acre Carrizo Energy Solar Farm project, there are two proposed large acreage solar farm projects within the vicinity of the CESF site; the Topaz Solar Farm and California Valley Solar Ranch (**Visual Resources Figure 27** – Location of

Carrizo Energy Solar Farm, Topaz Solar Farm and California Valley Solar Ranch Project Sites). Construction of the Topaz Solar Farm and the California Solar Ranch are anticipated to begin in 2010 and take three years to complete.

In August 2008, OptiSolar, Incorporated filed a conditional use permit application with the San Luis Obispo County Department of Planning and Building to permit the operation of a 550 megawatt photovoltaic Topaz Solar Farm. The Topaz Solar Farm would cover approximately 6,200 acres (9.7 square miles). The Topaz project is to be located to the east and north of the Carrizo Energy Solar Farm project (**Visual Resources Figure 28** – Topaz Solar Farm Conceptual Site Plan).The county is preparing an environmental impact report for the project.

SunPower Corporation intends to submit a conditional use permit application with San Luis Obispo County for their proposed California Valley Solar Ranch project before the end of 2008. The California Valley Solar Ranch project is a photovoltaic generating facility capable of producing 250 megawatts. The facility would cover approximately 2,240 acres (3.5 square miles) straddling the north and south sides of SR-58, approximately 7.5 miles from the Carrizo project site.

The Topaz Solar Farm project would be constructed on relatively flat land that is comprised of annual grassland, and land in varying stages of dry-farm production. The Topaz Solar Farm project will consist primarily of photovoltaic (PV) panels on steel support structures that are anchored to at-grade concrete ballasts. The solar panels are dark in color. The rows of PV panels are to be tilted upwards and facing towards the south or southwest. The PV panels have a low-profile. The highest end of the tilted panel would stand less than three feet above the ground. The panels are to be arranged into blocks. The rows of panels will be spaced approximately four to five feet apart to prevent them from shading one another. This spacing distance is based on an assumed panel tilt angle of 15 degrees. Unpaved aisles are to be created around the perimeter of the approximate five-acre PV blocks. A buffer zone with a minimum width of 35 feet will be maintained between the PV panels and all surrounding land. Each PV block will also contain an inverter (20’x 10’ x 8’) and transformer (20’ x 10’ x 8’). The inverter and transformer will be centrally located within each PV block; housed together on a concrete pad. The transformer and inverter unit will stand a maximum of eight feet in height. The medium-voltage collection system lines transmitting power from each PV block will be buried underground and connected to the project’s substation (**Visual Resources Figure 29a** – Simulation of Topaz Solar Farm Project from State Route 58 Looking North Along the Carrizo Project Site West Boundary, and **Visual Resources Figure 29b** – Simulation of Topaz Solar Farm Project from Bitterwater Road).

The Topaz Solar Farm involves essentially no moving parts, no thermal cycle, and no water use for electricity generation, a low visual profile of the panels, and an underground medium-voltage collection system. A preliminary landscaping plan is to be prepared by the project owner as part of the county’s environmental review.

The planting of landscaping along the Carrizo project’s west property line may be limited due to the proposed development of the Topaz Solar Farm. The Topaz project includes the approximate 127-acre parcel (Parcel 16 of 25 PM 40) that adjoins the west property line of the Carrizo project site. This parcel is to be developed with solar panels enclosed by a 6 to 8-foot tall chain link electric fence. The parcel spans 3,252 feet of the 5,365-

foot long west boundary of the Carrizo site. In addition, in between the Topaz and Carrizo parcels is a recorded 50-foot wide ingress/egress and public utility easement. There is also a recorded 50-foot wide offer of road dedication to the County that covers the same ingress/egress easement (TSF2008, sheet 15). Staff does not know if the road dedication was accepted by the County. The building of the Topaz project may offer some visual screening of the Carrizo project to nearby residences.

At the current time, it is unknown to staff what equipment SunPower Corporation may use on its proposed site. SunPower's proprietary tracker for power plant operations uses a single-axis design that enables solar panels to automatically track the sun's movement throughout the day. The trackers are made of galvanized corrosion-resistant steel.

The Carrizo Energy Solar Farm, Topaz Solar Farm and the California Valley Solar Ranch at "build out" would cover nearly 9,000 acres on the Carrizo Plain. At this time, staff does not have information about lighting, glare and glint, surface treatments, landscaping or screening by the Topaz and California Valley projects to evaluate potential cumulative visual impact to the area. The existing landscape of the northern Carrizo Plain would be altered by these projects. The three projects range between four and ten miles from the Carrizo Plain National Monument. The development of the Carrizo Energy Solar Farm, Topaz Solar Farm and the California Valley Solar Ranch may introduce a significant visual cumulative impact.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff considers federal, state, and local LORS relevant to aesthetics, or protection and preservation of sensitive visual resources. Staff examines land use planning documents such as a Corridor Management Plan, Local Coastal Plan, General Plan, zoning ordinances, and other government or municipal code sections applicable to the project site and surrounding area pertaining to aesthetics, or protection and preservation of sensitive visual resources.

Visual Resources Table 3 provides an analysis of the applicable LORS pertaining to aesthetics, or preservation and protection of sensitive visual resources relevant to the proposed project. Conditions of certification are proposed to make the project conform to a LORS where appropriate.

VISUAL RESOURCES Table 3
Proposed Project's Consistency with
LORS Applicable to Visual Resources

LORS		Consistency Determination	Basis for Consistency
Source	**Policy and Strategy Descriptions**		
Local			
San Luis Obispo County Code			

Title 22, Land Use Ordinance			
Section 22.10.060 Exterior Lighting	The standards of this section are applicable to all outdoor night-lighting sources installed, except for street lights located within public rights-of-way and all uses established in the "Agriculture" land use category.	YES AS PROPOSED	The project site is located within the "Agriculture" land use category as shown on the county's Shandon-Carrizo North Planning Area Rural Land Use Category Map. No exterior lighting standards are applicable to the project site.
Section 22.10.080 Fencing and Screening	The maximum height of a fence or wall within the "Agriculture" land use category is 12 feet where open structures are being enclosed by the fence. Open wire or chain link or other materials approved by the San Luis Obispo County Department of Planning and Building that permit the passage of a minimum 90 percent of light.	NO AS PROPOSED	Perimeter security fencing for the project site and construction laydown area would be a maximum of 6.5 feet in height, and consist of chain-link fence with three strands of barbwire on top. At operation privacy slats are to be inserted into the perimeter fence on the project site to help block potential glint and glare from solar reflectors (CESF2007a, pg. 5.13-17 and CESF2007e, pg. 2.13-4). At the present time, the San Luis Obispo County Department of Planning and Building, or the California Energy Commission has not approved open wire, chain link or other materials use for the project.
Section 22.10.090 Height Measurement and Height Limit Exceptions	C. Height Limits. The maximum height for new structures is as follows, except where other height limits are established by planning area standards of Chapter 22.90 (Applicability of Community Planning Standards). 1. Maximum allowed height by Land Use Category: • Agriculture, Rural Lands - 35 feet 2. Exceptions to Height Limitations. a. San Luis Obispo County Planning Commission Modifications: Buildings and structures exceeding the heights permitted within the Land Use Category may be authorized through use permit approval, provided the county planning commission first finds the project; see "Use Permit Findings For Exceptions to Height Limitations" below. c. Uninhabited Structures. The height limits specified in subsection C.1 do not apply to the following structures: (7) Public Utilities. Poles and	NO AS PROPOSED	The CESF proposes several structures that exceed the 35-foot height requirement for the "Agriculture" land use category. The project's two115-foot tall air cooled condenser units (**Visual Resources Figure 30a**- Elevation of Air Cooled Condenser Looking South and **Visual Resources Figure 30b**- Elevation of Air Cooled Condenser Looking West), and the 60-foot tall steam turbine generator enclosures would exceed the 35-foot height limit. These uninhabited structures do not fall under the county's height limit exceptions for public utilities or solar collectors. The project's 58-foot tall steam drum and support structures, and the 56-foot tall receivers are considered solar collector items. Staff has determined that these uninhabited structures exceed the county's 40-foot height limit for solar collectors. The project's transmission line steel poles at the 230kV connection are to be150 feet tall, the 230kV transmission poles in-line are to be 100 feet tall, and the take-off, dead-end and bus structures are to be 40

	structures for providing electrical and communications services. (8) Solar Collectors. Not more than five feet above the height limit specified in subsection C.1.		feet tall. Staff has determined that these structures would be included under the public utilities exception. Staff has prepared for consideration by the Energy Commission use permit "findings" for the issuance of an exception to the county height limitation (see discussion below).
	Use Permit Findings For Exceptions to Height Limitations:		The county's use permit procedure is subsumed in the California Energy Commission's licensing process because of the Commission's exclusive permitting authority over the project found under Public Resources Code section 25500 et sequences. This permitting authority allows the Energy Commission to consider the San Luis Obispo County "findings" for the issuance of a use permit to exceed the 35-foot height limitation in the "Agriculture" land use category. Using the county's two "findings" found in section 22.10.090 C.2.a, visual resource staff prepared the following responses (below).
	• will not result in substantial detrimental effects on the enjoyment and use of adjoining properties; and,	UNKNOWN	The project owner has provided a glint and glare study and a preliminary lighting plan (see **Appendix VR-2 and VR-3**). The project owner has proposed measures to control light trespass, and glint and glare beyond the boundaries of the project site. Staff has contacted a consultant to review the adequacy of these documents. The project owner has offered to provide landscaping on neighboring properties with residences to screen the view of the project. Views of the surrounding mountains across the northern Carrizo Plain would be partially or fully blocked from neighboring residences to the north and west by the project.
	• the modified height will not exceed the lifesaving equipment capabilities of the fire protection agency having jurisdiction.	YES AS CONDITIONED	Fire support services to the site are under the jurisdiction of the California Department of Forestry and Fire Protection/San Luis Obispo County Fire Department (CDF/SLOCFD). The project owner would be required by Conditions of

			Certification **WORKER SAFETY-1** and **2** to provide a final fire protection and prevention program to both Energy Commission staff and the CDF/SLOCFD prior to the construction and operation of the project in order to confirm the adequacy of proposed fire protection measures. For further discussion see the **Worker Safety and Fire Protection** section of this PSA.
Section 22.10.140 Setbacks	D.1. Basic front setback requirement - all structures with a height greater than 3 feet shall be set back a minimum of 25 feet from the nearest point on the front property line. E.1. b. General side setback requirements within rural areas - minimum of 30 feet on sites of 1-acre or larger in net area. F. Rear setbacks - minimum 30 feet on sites of 1-acre or larger in net area.	YES AS PROPOSED	As shown on Figure1.2-2 and Figure 1.2-3 in the Supplement to the Carrizo Energy Solar Farm Application for Certification, July 2008, the project would comply with the county's setback requirements (CESF2007e).
Section 22.10.160 Underground Utilities	Utilities serving new structures shall be installed underground rather than by the use of poles and overhead lines, and where applicable shall be installed in accordance with California Public Utilities Commission rules and regulations. This requirement does not apply to the following: A. New structures on parcels of five acres or larger or requiring uninterrupted utility runs of five hundred feet or more.	YES AS PROPOSED	The CESF project is to be constructed on a 640-acre parcel. It is not required to have its utilities installed underground.
Section 22.16.020 Applicability of Landscaping Standards	3. Large Rural Parcels. When located outside of an urban or village area, any parcel larger than two acres is not required to be landscaped. Landscape may be required by Article 4, or by use permit or minor use permit conditions of approval. In any case, all areas not proposed for development shall be cultivated, or maintained in native vegetation, and any applicable requirements of Chapter 22.50 (Fire Safety) shall be satisfied.	UNKNOWN	The CESF project site consists of 640 acres. The project owner is not proposing any landscaping on the project site. It is noted that the county has requested perimeter landscaping (see Response To Agency And Public Comments section in this assessment below). Landscaping may be required by Article 4, or by use permit or minor use permit conditions of approval. As previously noted, the county's use permit procedure is subsumed in the California Energy Commission's licensing process because of the Commission's exclusive permitting authority over the project found under Public

			Resources Code section 25500 et sequences. Staff has drafted for consideration Condition of Certification **VIS-4** should perimeter landscaping be used to soften the industrial appearance of the project.
Section 22.20.010 Sign Ordinance	No sign shall be constructed, displayed or altered without first obtaining a sign permit as required by this section, except where a sign is exempted from permit.	YES AS CONDITIONED	The project's AFC and supplements do not discuss the installation of onsite or offsite signs. Staff has recommended Condition of Certification **VIS-6** to ensure compliance with the county's sign ordinance.
Section 22.30.360 Pipelines and Transmission Lines	This section provides standards for pipeline and power and communications transmission lines and related facilities, where designated as allowable by the land use category (Section 22.06.030). Except as otherwise provided by this section for specific facilities, and except where county land use permit authority is preempted by state law, the land use permit required to authorize a proposed land use of this type is determined by the magnitude of site disturbance as follows: a zone clearance permit for less than 40,000 square feet, and minor use permit for 40,000 square feet or more.	YES AS PROPOSED	The project owner has filed for a license with the California Energy Commission for this project. The California Energy Commission has exclusive permitting authority over the project including linear facilities (e.g., overhead transmission lines, water supply pipelines, natural gas pipelines, etc.).

RESPONSE TO AGENCY AND PUBLIC COMMENTS

San Luis Obispo County Department of Planning and Building

Letters dated March 11, 2008, and February 18, 2008 were received from John McKenzie, Environmental Specialist for the San Luis Obispo County Department of Planning and Building. Both letters include comments pertaining to aesthetic, or preservation and protection of sensitive visual resources pertaining to the project.

The March 11, 2008 letter had the following comment:

> The Land Use Ordinance does not address plain development specifically on visual issues and is left to be addressed through the CEQA process. Therefore, due to the industrial appearance of this facility combined with its height and size, all efforts should be made to reduce heights of all structures to the maximum extent feasible, minimize night lighting to the maximum extent (e.g., keeping light standards as low as possible, illumination levels should be at the lowest levels possible, and all lights fully shielded from all surrounding properties). Perimeter landscape screening should be used to soften these impacts and designed in a manner to have as much of a natural appearance as possible.

The February 18, 2008 letter included the following:

> The Carrizo Plain is considered to have reasonably high natural and rural visual qualities. Due to the industrial appearance of this facility combined with its size, all efforts should be made to reduce heights of all structures, minimize night lighting to the maximum extent possible (e.g., keeping light standards as low as possible, illumination levels should be at the lowest levels possible, and all lights fully shielded from all surrounding properties). Perimeter landscape screening should be used to soften these impacts and designed in a manner to have as much of a natural appearance as possible.

Energy Commission Staff Response

The applicant has reduced the height of the administration building (habitable structure) from 40 feet tall to 35 feet tall. The project's transmission line steel poles at the 230kV connection are to be 150 feet tall, the 230kV transmission poles in-line are to be 100 feet tall, and the take-off, dead-end and bus structures are to be 40 feet tall. Staff has determined that these structures would be included under the county's public utilities exception for their heights.

The project's two 115-foot tall air cooled condenser units and the 60-foot tall steam turbine generator enclosures would exceed the county's 35-foot tall height limit. These uninhabited structures do not fall under the county's height limit exceptions for public utilities or solar collectors. Although the project's 58-foot tall steam drum and support structures, and the 56-foot tall receivers are considered solar collector items, staff has determined that these uninhabited structures exceed the county's 40-foot height limit for solar collectors.

The county's use permit procedure is subsumed in the California Energy Commission's licensing process because of the Commission's exclusive permitting authority over the project found under Public Resources Code section 25500 et sequences. This permitting authority allows the Energy Commission to consider the San Luis Obispo County "findings" for the issuance of a use permit to exceed the 35-foot height limitation in the "Agriculture" land use category using the county's two "findings" found in section 22.10.090 C.2.a. and discussed in Table 3 of this assessment.

The project owner has submitted a glint and glare study and a preliminary lighting plan (see **Appendix VR-2** and **Appendix VR-3**). At this time, staff has not made a conclusion regarding the adequacy of the glint and glare study or the preliminary lighting plan. Staff has contacted a consultant to review the glint and glare study. Staff has drafted Condition of Certification **VIS-7** requiring the submittal of a lighting management plan.

The applicant has stated they are not going to be planting perimeter landscaping on the project site. The county has requested the planting of perimeter landscaping to soften the project's industrial appearance.

The potential planting of landscaping along the Carrizo project's west property line may be limited due to the development of the Topaz Solar Farm and its site fencing

requirements. The Topaz project includes use of an approximate 127-acre parcel that borders the west property line of the Carrizo project site.

Between the Topaz and Carrizo project parcels is a recorded 50-foot wide ingress/egress and public utility easement. There is also a recorded 50-foot wide offer of road dedication to the County covering the same easement area (TSF2008, sheet 15). It is not known to staff if the County accepted this road dedication (county public right of way). The 50-foot wide ingress/egress and public utility easement may limit the planting of landscaping along the project's west boundary.

A perimeter landscaping plan has not been prepared for the project site and reviewed by staff. The potential applicability of planting of evergreen trees interspersed with other drought tolerant plants along the project's perimeter is unknown at that this time. San Luis Obispo County Code, section 22.16.020 Applicability of Landscaping Standards - Large Rural Parcels states when located outside of an urban or village area, any parcel larger than two acres is not required to be landscaped. However, landscaping may be required by Article 4, or by use permit or minor use permit conditions of approval. As previously noted, the county's use permit procedure is subsumed in the California Energy Commission's licensing process because of the Commission's exclusive permitting authority over the project found under Public Resources Code section 25500 et sequences. Staff has drafted for consideration Condition of Certification **VIS-4** should perimeter landscaping be deemed necessary to soften the appearance of the project.

Also, staff has drafted a potential Condition of Certification **VIS-5** which would require the project owner to contact individual property owners who have an existing residence on their property within a one-mile radius of the project site boundary to discuss having landscaping planted on their property to screen the view of the project from the residence.

CONCLUSIONS

The visual analysis focused on two main issues. (1) Would construction and operation of the project introduce an aesthetic impact in accordance to CEQA? (2) Would the project comply with applicable LORS pertaining to aesthetics, or preservation and protection of sensitive visual resources?

1. Staff is evaluating the impact of the proposed CESF on a unique resource such as the northern Carrizo Plain. The conclusion will be provided in the Final Staff Assessment.

2. The project does not have frontage on, or traverse a segment of a road recognized as a National Scenic Byway or All American Road, or a State Scenic Highway.

3. The project would be highly visible to several nearby residents and roadway users within 0.5 mile, from the Carrisa Plain School and other residences within 1.0 mile, and form locations within the northern Carrizo Plain and surrounding mountains, 3.5 to 5.0 miles.

4. There would be no publicly visible water vapor plumes emitted by the project at operation during normal weather conditions based on the project owner's proposed facility design.

5. At this time, staff cannot make a conclusion regarding the project's potential introduction of glint or glare to the northern Carrizo Plain area at operation.

6. At this time, staff does not have information about lighting, glint and glare, surface treatments, landscaping or screening for the proposed Topaz Solar Farm project, and the foreseeable California Solar Ranch project to evaluate the potential visual cumulative impact.

7. At this time, staff cannot conclude that the project would comply with all applicable laws, ordinances, regulations, and standards pertaining to aesthetics, or preservation and protection of sensitive visual resources (Visual Resources Table 3).

The operation of the Carrizo Energy Solar Project as proposed may introduce an aesthetic impact under CEQA, and may be inconsistent with applicable LORS pertaining to aesthetics, or preservation and protection of sensitive visual resources.

Additional Information Needed To Complete Final Staff Assessment

- A description by the applicant of the colors and materials of the buildings and structures, a lighting plan, and site screening for the laydown area.
- Clarification by the applicant as to whether the 50-foot wide ingress, egress and public utility easement and road dedication between the Topaz property on section 29 and the Carrizo project on section 28 would prohibit or limit the planting of landscaping along the Carrizo project's west boundary.
- A perimeter landscaping plan has not been prepared for the project site and reviewed by staff at this time.
- Staff's securing of a consultant to review and provide comments on the applicant's glint and glare study.
- Information to evaluate potential cumulative visual impact to the area about lighting, glare and glint, surface treatments, landscaping or screening proposed by the Topaz Solar Farm and California Valley Solar Ranch.

PROPOSED CONDITIONS OF CERTIFICATION

To help reduce an identified aesthetic impact discussed in this analysis to a less than significant effect under CEQA, or address a sensitive visual resource related inconsistency under a LORS introduced by the proposed project, staff has drafted conditions of certification (below) for consideration that may be incorporated into the license should a decision to issue a license be made on the project.

Construction Lighting

VIS-1 The project owner shall ensure that lighting on the construction site and the construction laydown area is in a manner that minimizes potential night lighting impacts, as follows:

a) All lighting shall be of minimum necessary brightness consistent with worker safety and security;

b) All fixed position lighting shall be shielded/hooded to direct light downward, and toward the area to be illuminated preventing direct illumination of the night sky and direct light trespass (direct light extending outside the boundaries of the solar farm site, the construction laydown area, or the site of construction of ancillary facilities, including any security related boundaries);

c) Wherever feasible and safe and not needed for security, lighting shall be kept off when not in use; and

d) If the project owner receives a complaint about construction lighting, the project owner shall notify the Compliance Project Manager (CPM) and shall use the complaint resolution form included in the General Conditions section of the Compliance Plan to record each lighting complaint and to document the resolution of that complaint. The project owner shall provide a copy of each complaint form to the CPM.

Verification: Within seven days after the first use of construction lighting, the project owner shall notify the CPM that the lighting is ready for inspection.

If the CPM notifies the project owner that modifications to the lighting are needed to minimize impacts, within 15 days of receiving that notification the project owner shall implement the necessary modifications and notify the CPM that the modifications have been completed.

Within 48 hours of receiving a lighting complaint, the project owner shall provide to the CPM; a) a report of the complaint, b) a proposal to resolve the complaint, and c) a schedule for implementation of the proposal. The project owner shall notify the CPM within 48 hours after completing implementation of the proposal. The project owner shall provide a copy of the completed complaint resolution form to the CPM in the next Monthly Compliance Report.

Surface Restoration

VIS-2 The project owner shall remove all evidence of construction activities, and shall restore the ground surface to the original condition or better condition, including the replacement of any vegetation during construction where project development does not preclude it. The project owner shall submit to the CPM for review and approval a surface restoration plan, the proper implementation of which will satisfy these requirements. The project owner shall complete surface restoration within 60 days after the start of commercial operation.

Verification: At least 60 days prior to the start of commercial operation, the project owner shall submit the surface restoration plan to the CPM for review and approval.

If the CPM notifies the project owner that any revisions of the surface restoration plan are needed, within 30 days of receiving that notification the project owner shall submit to the CPM a plan with the specified revisions.

The project owner shall complete surface restoration within 60 days after the start of commercial operation. The project owner shall notify the CPM within seven days after completion of surface restoration that the restoration is ready for inspection.

Surface Treatment of Project Structures and Buildings

VIS-3 The project owner shall color and finish the surfaces of all project structures and buildings visible to the public to ensure that they: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive.

The project owner shall submit a surface treatment plan to the CPM for review and approval. The surface 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 and building (e.g., building, tank, and pipe; 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 completing the treatment; and

e) A procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not request vendor surface treatment of any buildings or structures during their manufacture, or perform final field treatment on any buildings or structures, until the project owner has received treatment plan approval by the CPM.

The project owner shall notify the CPM that surface treatment of all listed structures and buildings has been completed and is ready for inspection; and shall submit one set of electronic color photographs from KOPs 1, 2, and 3 showing the “as built” surface treated structures and buildings.

Verification: At least 45 days prior to applying vendor color(s) and finish(es) for structures or buildings to be surface treated during manufacture, the project owner shall submit the proposed treatment plan to the CPM for review and approval, and simultaneously to the Director of the San Luis Obispo County Department of Planning and Building or designee for review. The project owner shall allow the Director of the

San Luis Obispo County Department of Planning and Building or designee at least 30 days to provide comment on the submitted surface treatment plan. The project owner shall provide a copy of the Director of the San Luis Obispo County Department of Planning and Building comments to the CPM.

The project owner shall provide to the CPM a copy of the transmittal letter submitted to the Director of the San Luis Obispo County Department of Planning and Building requesting their review of the submitted surface treatment plan.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to the CPM for review and approval.

If the CPM determines that the plan requires revision, the project owner shall provide to the Director of the San Luis Obispo County Department of Planning and Building a plan with the specified revision(s) for review before the plan is implemented.

Within ninety (90) days after 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 is ready for inspection; and shall submit one set of electronic color photographs from KOPs 1, 2, and 3 showing the “as built” surface treated structures and buildings.

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) major maintenance activities that occurred during the reporting year; and c) the schedule of major maintenance activities for the next year.

Perimeter Landscaping

VIS-4 The project owner shall provide landscaping in sufficient quantity and size to create an attractive and noticeable bond of vegetation and color on boundaries with public views.

The project owner shall submit to the CPM for review and approval a landscaping plan whose proper implementation will satisfy this requirement. The plan shall include:

a) A detailed landscape, grading, and irrigation plan, at a reasonable scale that demonstrates how the landscaping requirement stated above shall be met;

b) An installation schedule;

c) Maintenance procedures for irrigation and a plan for routine annual or semi-annual debris removal for the life of the project; and

d) A procedure for replacement of unsuccessful plantings for the life of the project.

The project owner shall not implement the plan until the project owner receives approval of the plan from the CPM. The planting must be completed by the start of commercial operation, and the planting must occur during the optimal planting season.

Verification: Prior to commercial operation and at least 90 days prior to installing the landscaping, the project owner shall submit the landscaping plan to the CPM for review and approval.

If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before the plan is implemented. The project owner shall report on landscape maintenance activities in each Annual Compliance Report.

Offsite Landscaping

VIS-5 The project owner shall contact individual property owners who have an existing residence on their property within a one-mile radius of the project site boundary to discuss having landscaping planted on their property to screen the view of the project from the residence. Landscaping planted for the purpose of screening the project site shall be provided at the project owner's expense.

If the property owner agrees to have landscaping planted, the project owner shall execute a written agreement with the willing property owner. The written agreement shall include, at the least, the signature of the property owner consenting to the planting of landscaping, a description of the agreed upon tree and/or vegetation type and species to be planted, a description of the specific location on the property where landscaping is to be planted, and a long-term maintenance arrangement.

The project owner shall submit to the CPM for approval a copy of the executed written agreement with the property owner. The project owner shall not implement the planting of landscaping until the project owner receives approval from the CPM.

The planting of landscaping must be completed by the start of commercial operation, and the planting must occur during the optimal planting season.

Verification: Prior to commercial operation and at least 14 days prior to planting landscaping, the project owner shall provide copies of the executed written agreements to the CPM for approval.

The project owner shall notify the CPM within seven days after completing the planting of landscaping for all properties, that the landscaping is ready for inspection.

Signage

VIS-6 The project owner shall install minimal signage visible to the public, which shall a) have unobtrusive colors and finishes that prevent excessive glare; and b) be consistent with the policies and ordinances of the County of San

Luis Obispo. The design of any signs required by safety regulations shall conform to the criteria established by those regulations. The project owner shall submit a signage plan for the project to the CPM for approval and simultaneously to Director of the San Luis Obispo County Department of Planning and Building or designee for comment. The project owner shall not implement the plan until the project owner receives approval of the submittal from the CPM.

Verification: Prior to the start of commercial operation and at least 30 days prior to installing signage, the project owner shall submit the signage plan to the CPM for approval and simultaneously to the Director of the San Luis Obispo County Department of Planning and Building or designee for comment. The project owner shall provide a copy of the Director of the San Luis Obispo County Department of Planning and Building comments to the CPM.

If the CPM determines that the signage plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any signage visible to the public is installed.

The project owner shall provide the CPM with electronic color photographs after completing installation of signage.

Permanent Exterior Lighting

VIS-7 To the extent feasible, consistent with safety and security considerations and commercial availability, the project owner shall design and install all permanent exterior lighting such that a) light fixtures do not cause obtrusive spill light beyond the project site; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky; d) illumination of the project and its immediate vicinity is minimized, and e) lighting complies with local policies and ordinances. The project owner shall submit to the CPM for approval a lighting management plan that includes the following:

a) A process for addressing and mitigating lighting related complaints;

b) Lighting shall incorporate commercially available fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

c) All lighting shall be of minimum necessary brightness consistent with operational safety and security; and

d) 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.

Verification: At least 14 days prior to ordering any permanent exterior lighting, the project owner shall contact the CPM to determine the required documentation for the lighting management plan.

At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to the CPM for approval a lighting management plan. If the CPM determines that the lighting management plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for approval. The project owner shall not order any exterior lighting until receiving CPM approval of the lighting management plan.

Prior to commercial operation, the project owner shall notify the CPM that the lighting has been installed and is ready for inspection. If after inspection the CPM notifies the project owner that modifications to the lighting are needed, within 30 days of receiving notification the project owner shall implement the modifications and notify the CPM that the modifications have been completed and are ready for inspection.

Within 10 days 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 10 days after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to the CPM within 30 days of complaint resolution.

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APPENDIX VR-1

ENERGY COMMISSION VISUAL RESOURCE ANALYSIS EVALUATION CRITERIA FOR KEY OBSERVATION POINTS

Visual Resource Analysis without Project

When analyzing KOPs of existing conditions without the project, staff considers the following conditions: visual quality, viewer concern, visibility, number of viewers, duration of view. Those conditions are then factored into an overall rating of viewer exposure and viewer sensitivity. Information about each condition and rating follows.

Visual Quality

An expression of the visual impression or appeal of a given landscape and the associated public value attributed to the resource. Visual quality is rated from *high* to *low*. A high rating is generally reserved for landscapes viewers might describe as picture-perfect.

Landscapes rated high generally are memorable because of the way the components combine in a visual pattern. In addition, those landscapes are free from encroaching elements, thus retaining their visual integrity. Finally, landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. On the contrary, landscapes rated *low* are often dominated by visually discordant human alterations.

Viewer Concern

Viewer concern represents the reaction of a viewer to visible changes in the viewshed — an area of land visible from a fixed vantage point. For example, viewers have a high expectation for views formally designated as a scenic area or travel corridor as well as for recreational and residential areas. Viewers generally expect that those views will be preserved. Travelers on highways and roads, including those in agricultural areas, are generally considered to have moderate viewer concerns and expectations.

However, viewers tend to have low-to-moderate viewer concern when viewing commercial buildings. Industrial uses typically have the lowest viewer concern. Regardless, the level of concern could be lower if the existing landscape contains discordant elements. In addition, some areas of lower visual quality and degraded visual character may contain particular views of substantially higher visual quality or interest to the public.

Visibility

Visibility is a measure of how well an object can be seen. Visibility depends on the angle or direction of views; extent of visual screening; and topographical relationships between the object and existing homes, streets, or parks. In that sense, visibility is determined by considering any and all obstructions that may be in the sightline—trees and other vegetation; buildings; transmission poles or towers; general air quality conditions such as haze; and general weather conditions such as fog.

Number of Viewers

Number of viewers is a measure of the number of viewers per day who would have a view of the proposed project. *Number of viewers* is organized into the following categories: residential according to the number of residences; motorist according to the number of vehicles; and recreationists.

Duration of View

Duration of view is the amount of time to view the site. For example, a high or extended view of a project site is one reached across a distance in two minutes or longer. In contrast, a low or brief duration of view is reached in a short amount of time—generally less than ten seconds.

Viewer Exposure

Viewer exposure is a function of three elements previously listed, *visibility*, *number of viewers*, and *duration of view*. Viewer exposure can range from a *low* to *high*. A partially obscured and brief background view for a few motorists represents a low value; and unobstructed foreground view from a large number of residences represents a high value.

Visual Sensitivity

Visual sensitivity is comprised of three elements previous listed, *visual quality*, *viewer concern*, and *viewer exposure*. Viewer sensitivity tends to be higher for homeowners or people driving for pleasure or engaged in recreational activities and lower for people driving to and from work or as part of their work.

Visual Resource Analysis with Project

Visual resource analyses with photographic simulations of the project involve the elements of contrast, dominance, view blockage, and visual change. Information about each element follows.

Contrast

Contrast concerns the degree to which a project's visual characteristics or elements (form, line, color, and texture) differ from the same visual elements in the existing landscape. The degree of contrast can range from *low* to *high*. A landscape with forms, lines, colors, and textures similar to those of a proposed energy facility is more visually absorbent; that is, more capable of accepting those characteristics than a landscape in which those elements are absent. Generally, visual absorption is inversely proportional to visual contrast.

Dominance

Dominance is a measure of (a) the proportion of the total field of view occupied by the field; (b) a feature's apparent size relative to other visible landscape features; and (c) the conspicuousness of the feature due to its location in the view.

A feature's level of dominance is lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is

(1) near the center of the view; (2) elevated relative to the viewer; or (3) has the sky as a backdrop. As the distance between a viewer and a feature increases, its apparent size decreases; and consequently, its dominance decreases. The level of dominance ranges from *low* to *high*.

View Blockage

The extent to which any previously visible landscape features are blocked from view constitutes view disruption. The view is also disrupted when the continuity of the view is interrupted. When considering a project's features, higher quality landscape features can be disrupted by lower quality project features, thus resulting in adverse visual impacts. The degree of view disruption can range from *none* to *high*.

Visual Change

Visual change is a function of *contrast*, *dominance*, and *view disruption*. Generally, *contrast* and *dominance* contribute more to the degree of visual change than does *view disruption*.

CARRIZO ENERGY SOLAR FARM GLINT AND GLARE STUDY

During operation, concentrated light from CESF reflectors will be directed at the absorber pipes in the receiver structure, which is approximately 60’ from ground level. Potential glare from light reflecting off of the absorber pipes is minimal, but will be analyzed below.

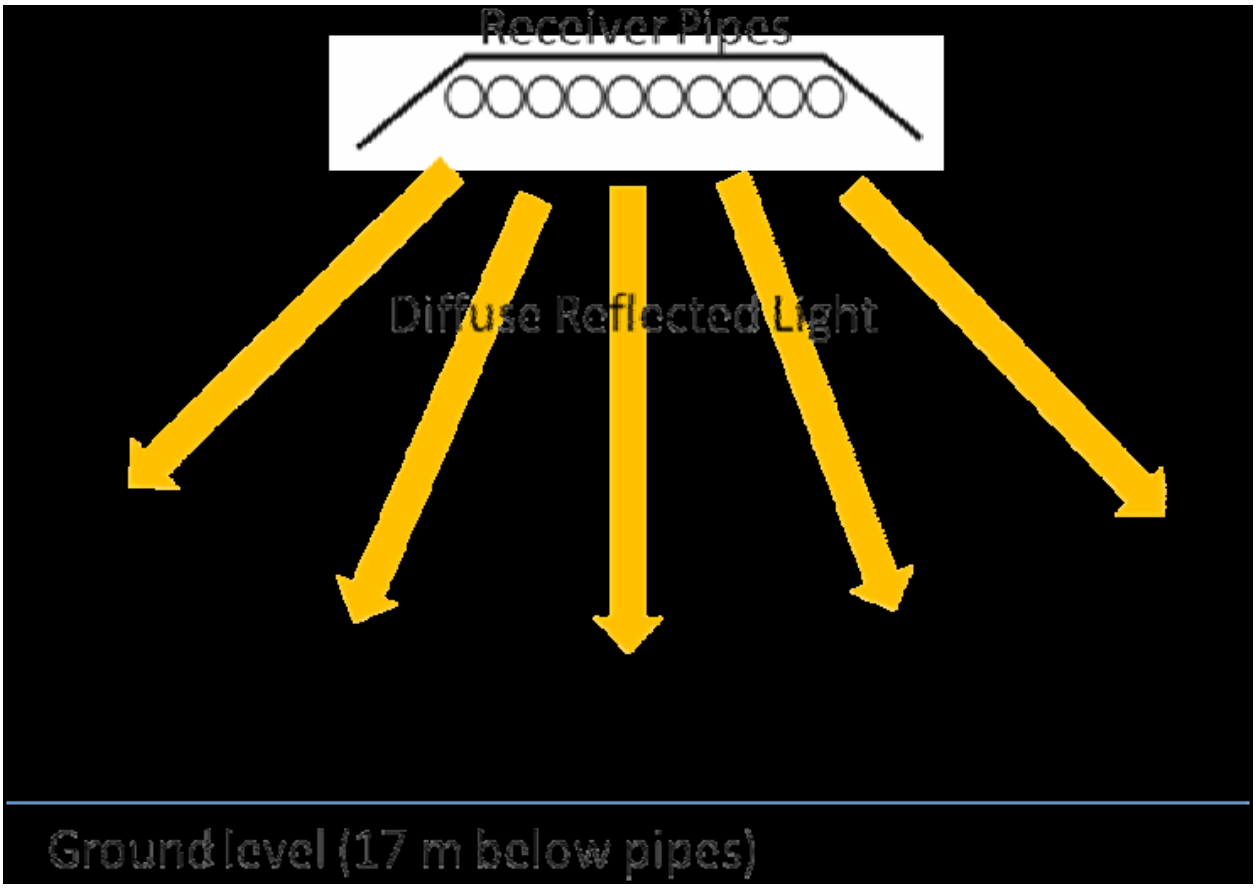


Figure 1: Diffuse reflected light from Receiver pipes spreads out as it travels to ground.

At peak performance, solar intensity on the receiver pipes will approach 30 kW/m2. Pipe absorptivity of the solar spectrum shall be 0.94; thus the intensity of reflected light from the pipes will be 0.06 * 30 kW/m2 = 1.8 kW/m2. The reflected light will be diffuse rather than specular, meaning that light will come off in random, scattered directions. If one approximates the Lambertian scatter as uniform over the half-cylinder formed beneath the receiver, the ability to estimate the intensity in the eyes of an observer at ground level is gained. The intensity drops off as a function of distance from the pipes. Using 0.6 meters as the width of the 10 absorber pipes and the half circumference defined by a radius of 17 m from the absorber pipes, the ratio for intensity decrease is 0.6: 53.4, or 0.011. This means that the intensity of reflected light from receiver pipes is about 0.011 * 1.8 kW/m2 = 0.02 kW/m2, or roughly 50 times less than the intensity of the sun. This solar intensity is not deemed to be a hazard.

As Reflectors move from a stow position into tracking position with light focused on absorber pipes, there is a possibility of a concentrated beam being directed horizontally to the east or west of the CESF boundary or spilling out to the north. The following is meant to clarify the issues of glare and glint off of the Reflectors.

The figure below illustrates the optics from the outside Reflectors in each line. The focal length of the outside Reflectors is about 77', at which point the beam focuses from 7.4' down to 1.0' wide, giving a maximum intensity of 7.4 kW/m2, assuming an zenith angle near 90° (in most conditions, the intensity at the focal length of the Reflector projected horizontally will be significantly less, decreasing by a factor of the sine of the zenith angle). For the sake of this study, the maximum intensity will be used. It becomes apparent by viewing the figure below that beyond the focal length of the Reflector, beam intensity decreases and by 144' from the Reflector, beam intensity is the equivalent of the incident solar intensity, that is, the beam is no brighter than the sun.

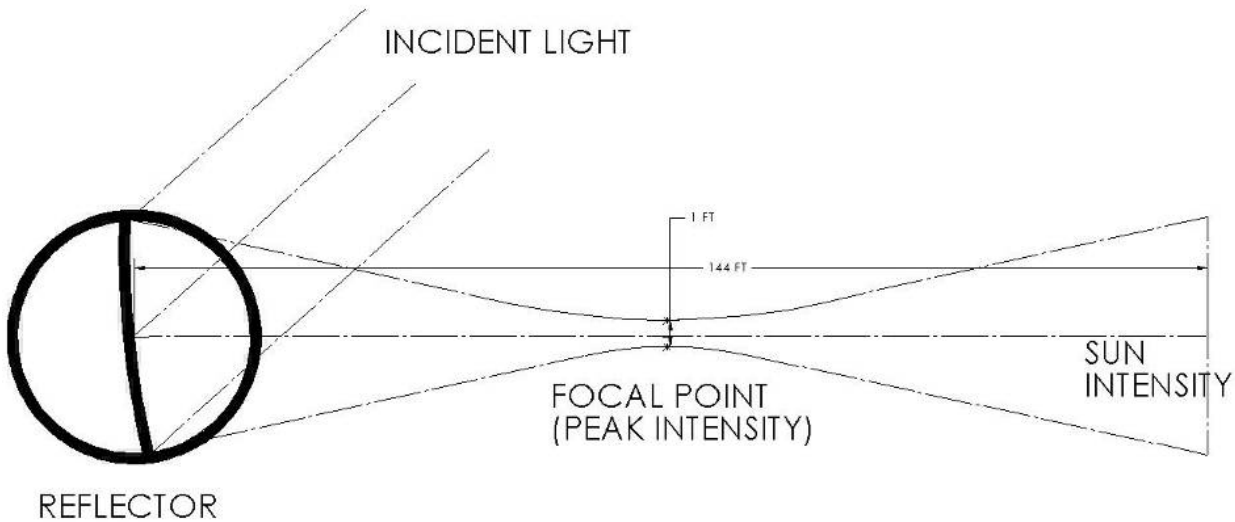


Figure 2: Diagram of convergence and divergence of light beam from outside Reflector.

Beyond 144', beam intensity continues to decrease. For example, at 1000' from the focal point of the Reflector, the beam intensity would be approximately 8% that of the sun intensity. Reflectors on the interior of each Line have shorter and shorter focal lengths, down to approximately 52' for the middle Reflectors. Beams from these Reflectors are highly unlikely to be cast out horizontally to the east or west, as they would be blocked by Reflectors to the outside of them. The beams could, however, spill to the north of the plant boundary when the sun is low in the southern sky.

The intensity of potential spillage to the north in the early morning and late evening and winter season will be diminished because of the decreased solar radiation at those times of day but the possibility does exist. Spilled beam intensity would diverge back out to incident solar intensity at a maximum of 155 ft from the northern plant boundary, assuming the worst case sun position at winter time noon and worst case reflector angle that would direct the incident beam parallel to the ground. Reflected light could focus from 40 – 60 ft north of the plant boundary, based on the different focal lengths of designed reflectors. In the highly unlikely case where multiple reflectors are directing beams parallel to the ground and spilling light to the north, the focused beams could not

be additive because only the portions that are not shaded by adjacent reflectors could escape the plant.

While horizontal glare to the East and West are possible any time of day as the reflectors roll from stow into tracking position, the tracking system and operational protocols for the CESF are designed to minimize this. During cleaning activities, adjacent reflector rows will be rolled to face each other, with the outside rows facing inward, both to prevent horizontal glare and also to allow cleaning crews to work on two rows at once and increase efficiency. Reflector rows are stowed facing the ground and thus glare will not be a problem during off hours. During tracking, Reflectors will be oriented to direct light towards the Receiver structure; should the beams just miss the Receiver, by the nature of the system focal distance, the beams will be diverged back to incident solar intensity at 60' above the Receiver structure. There are two conditions identified in which horizontal glare could occur:

1) Reflectors are moving from stow position to tracking position. In this situation, outside Reflectors (FL of 77') could direct the beam to the East or West of the property and any Reflector could cast a low intensity spilled beam to the North of the property.

2) Tracking system malfunction or failure, where Reflector rows go to an incorrect position or freeze up while directing a beam horizontally.

Condition (1) may occur every time the plant starts and finishes operations. It is believed that Condition (2) will be a rare occurrence and will be mitigated by full time maintenance crews who will repair stalled motors. Glare potential from Condition (1) and its effect on surrounding roads, public access areas, and structures will be considered.

Structures and areas near the CESF plant and their distance from plant boundaries are given below. The reference for these distances is given to the right of the distance.

Item	Distance from plant boundary	Reference
State Hwy 58	>200 feet to the South, no glare potential because sun is always in southern sky in northern hemisphere	Fig. No. 3.2-1, AFC submission
Tracy Lane	>200 feet East	Fig. No. 3.2-1, AFC submission
Nearest North residence	~1400 feet	Fig. No. 5.13-13, AFC submission
Nearest West residence	~1150 feet	Fig. No. 5.13-15, AFC submission

Table 1: Distances of structures and public access roadways from plant boundaries

In addition to these structures and locations, there may be pedestrians who venture closer to the property line. The following table shows the calculated beam intensity at a given distance from the plant boundary and also the time it would take the beam to

move across 6', the estimated height of a man, at that distance with the motor rotating the Reflector at 0.2 RPM. Note that these estimates are assuming 1 kW/m2 sun intensity.

Distance from Plant Boundary (ft)	Beam intensity (kW/m2)	6' travel time (s)	Affected party, location
0	3.67	9.5	-
20	5.44	5.7	-
40	7.22	4.1	-
60	4.00	3.2	-
80	1.89	2.6	-
100	1.24	2.2	-
200	0.46	1.2	Tracy Lane
1150	0.06	0.2	West Residence
1400	0.05	0.2	North Residence

Table 2: Computed beam intensity and speed at various distances from plant boundary

Glare on drivers on Tracy Lane will be less than half of the glare from the sun. Conservatively estimating the aperture of a driver's eye to be 1", glare would move across the eye in less than 1/100 of a second. Because Highway 58 is to the south of the plant and the reflectors are unable to direct sunlight to the south given the constant location of the sun in the southern half of the sky, it will be physically impossible to direct a beam to Highway 58.

It should be noted that pedestrians who are standing within 60' of the outside of the CESF perimeter fence to the North, East, or West may see a beam intensity as high or higher than what is recommended as a safe level on the human retina. A level deemed safe for the human eye is 4.5 kW/m21[2]. For this reason, the CESF will install privacy slats in the perimeter fence to ensure that pedestrians are not exposed.

Vertical glare from the Reflectors was addressed earlier during operation. Vertical glare may also be possible during construction, when Reflectors are stored with glass facing upward. However, as seen in the table above, the beam intensity at 200' high is less than that of the sun. The risk to passing planes is considered to be negligible.

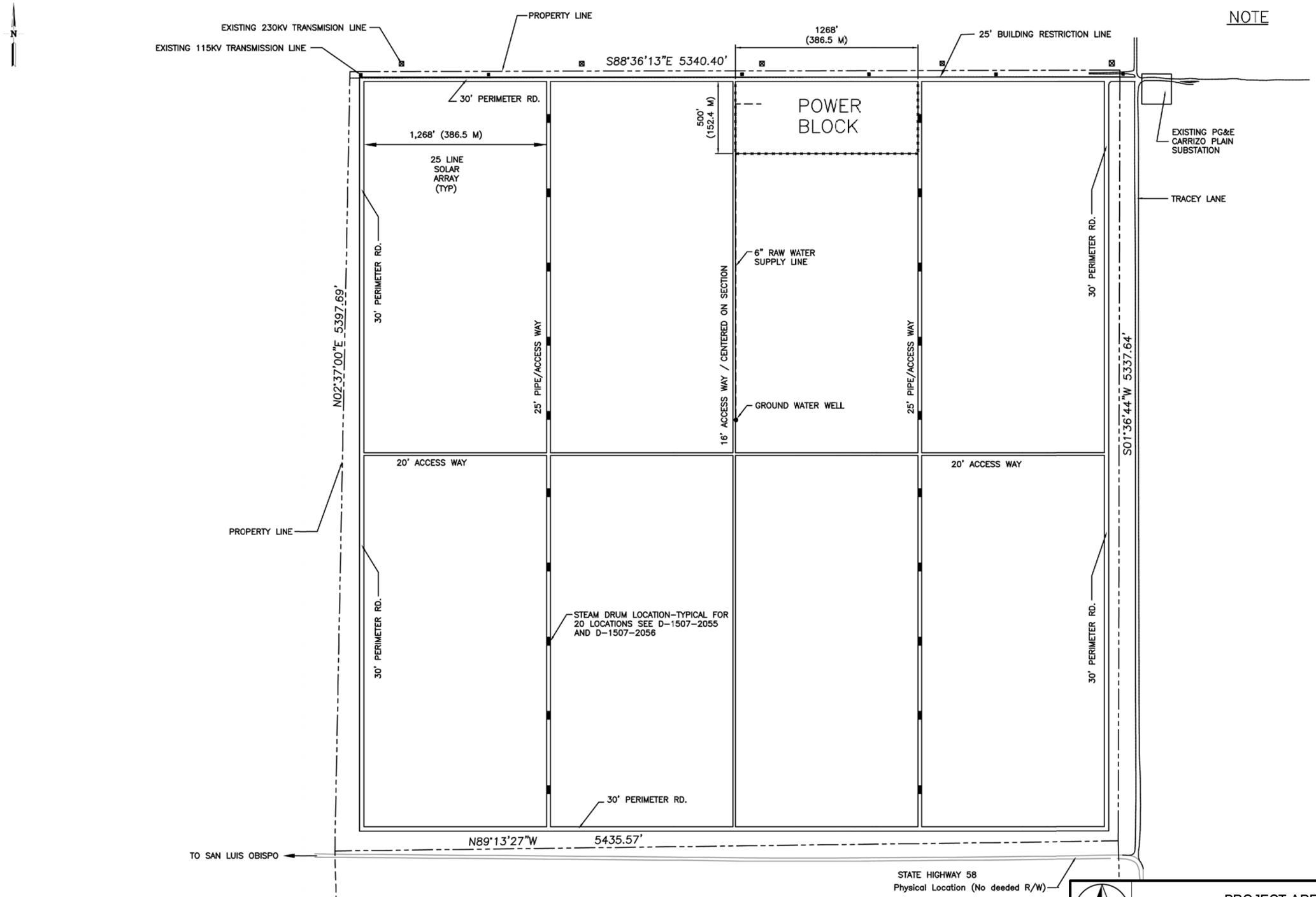
Additional glare may occur off of standard construction equipment such as cranes, trucks, or forklifts, but this would not be expected to exceed the intensity of incident sunlight.

The possibility of dust drifting in between the receiver and reflector and being illuminated by light rays coming from the reflectors and focusing down does exist. But if a dust particle is illuminated, it will reflect light diffusely, in random directions. There is no possibility of a specular (mirror-like reflection) light ray bouncing off of such a particle and creating hazards for viewers. If a large amount of dust drifted into the area above the mirrors during operation, it would indeed become illuminated and possibly brighten.

[2] 10 MWe Solar Thermal Central Receiver Pilot Plant: Beam Safety Tests and Analyses, pp. 26-31: SAND83-8035

However, such a dust cloud would also dim the light reaching the reflectors, and thus the brightened dust would be tempered by the decreased solar input.

The frequency of illuminated dust particles is expected to be rare and will not be a safety risk to either workers on site or passersby.



NOTE

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REV	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	DWG'D	PROJECT DWG	APPR'D BY
3	09/17/07	REVISED PROPERTY LINE	CM				
2	08/01/07	ADDED WEATHER STATION	KH				
1	07/20/07	ADDED 6" RAW WATER SUPPLY LINE	RB				
0	07/13/07	PRELIMINARY	CM				

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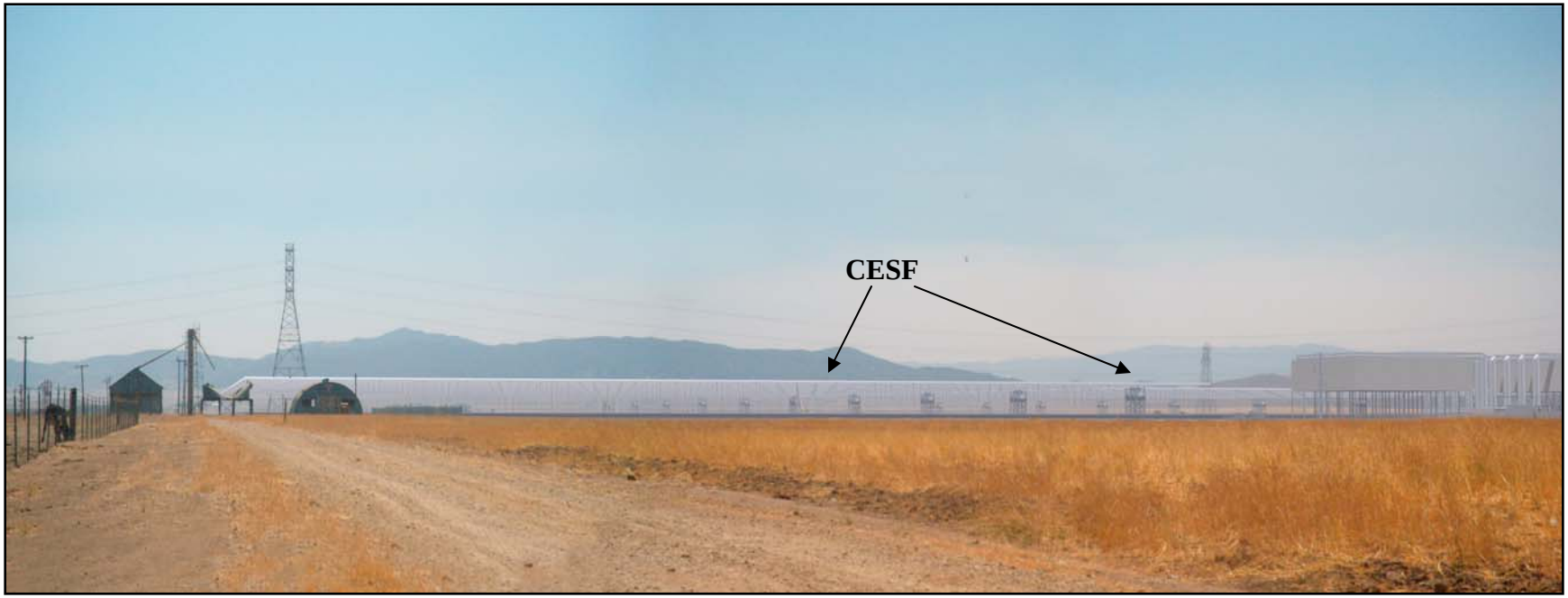
URS

PROJECT AREA LAYOUT PLAN
CARRIZO ENERGY SOLAR FARM (CESF)

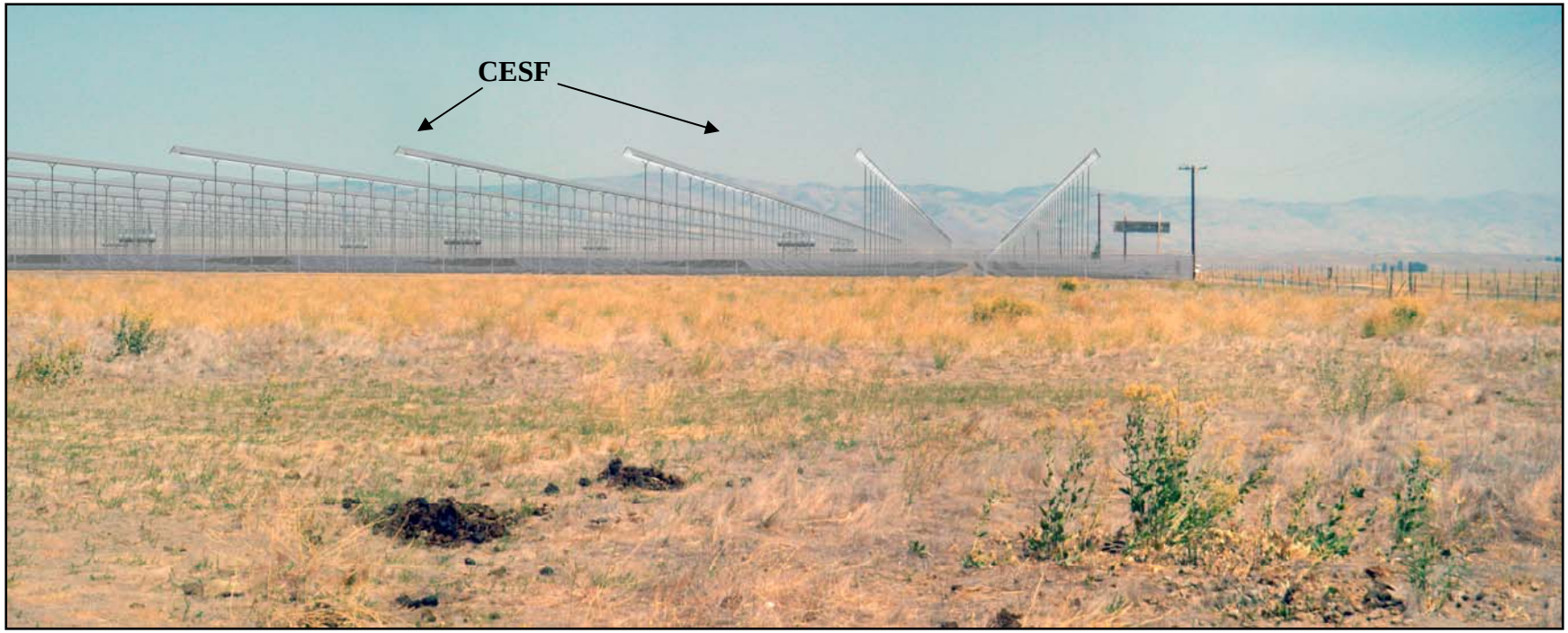
CREATED BY: PATCH	DATE: 09-24-07	FIG. NO:
PM: AL	PROJ. NO: 22239472	3.2-1



KOP 1: Simulated front yard view from the closest residence to the north, looking southwest toward CESF site (approximately 0.3-mile north of CESF). This photo location is meant to represent "worst-case" views from residential viewers to the north.

SIMULATED VIEW OF CESF FROM KOP #1
CARRIZO ENERGY SOLAR FARM (CESF)

URS	NO SCALE	CREATED BY: JN	DATE: 10-01-07	FIG. NO: 5.13-13
		PM:PM	PROJ. NO: 22239472	



KOP 2: Simulated front yard view from the closest residence to the west, looking northeast toward CESF site (approximately 0.2-mile west of CESF). This photo location is meant to represent "worst-case" views from residential viewers to the west.*

*****Note: 1. Slight distortion caused by panoramic merging of photos.
2. Simulation was placed on existing site topography. Proposed grading plan for terracing of landscape was not available at time of simulation. preparation, and therefore, is not reflected.

SIMULATED VIEW OF CESF FROM KOP #2
CARRIZO ENERGY SOLAR FARM (CESF)

URS

NO SCALE	CREATED BY: JN	DATE: 10-01-07	FIG. NO: 5.13-15
	PM:PM	PROJ. NO: 22239472	

APPENDIX VR-3

CARRIZO ENERGY SOLAR FARM PRELIMINARY LIGHTING PLAN

LIGHTING NOTES

1. VERIFY UNDERGROUND UTILITIES, PIPING AND DUCT BANKS PRIOR TO INSTALLATION.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL COORDINATION OF LIGHTING FIXTURE LOCATIONS AND FOR RELOCATION OF FIXTURE WHERE NECESSARY TO AVOID INTERFERENCE.

3. INSTALLATION DETAILS, WHEN SHOWN, ARE GENERAL IN NATURE AND SHALL BE ADAPTED TO SATISFY FIELD CONDITIONS.

4. GRAPHICAL REPRESENTATIONS ON THE LIGHTING DETAILS ARE GENERAL IN NATURE AND MAY NOT ACCURATELY DEPICT THE EQUIPMENT OF THE MANUFACTURER LISTED.

5. PHOTOELECTRIC CELLS SHALL BE POSITIONED IN THE FIELD AT A LOCATION FREE FROM SHADOWS CAUSED BY OBSTRUCTIONS, FACING NORTH, AND SUCH THAT LIGHT FROM THE LUMINARES BEING CONTROLLED DOES NOT SHINE ON THE CELL.

6. SEPARATE CONDUIT SYSTEMS SHALL BE PROVIDED FOR ALL RECEPTACLES AND LIGHTING CIRCUITS.

7. MOUNTING HEIGHTS OF LIGHTING FIXTURES SHALL BE THE DISTANCE BETWEEN THE FINISHED FLOOR OR GRADE AND THE BOTTOM OF THE FIXTURE.

8. ALL 120/208V RECEPTACLES, FIXTURES, AND SWITCHES SHALL BE GROUNDED BY MEANS OF A GREEN INSULATED GROUNDING CONDUCTOR RUN WITH THE LINE/PHASE CONDUCTORS FROM THE PANEL GROUND BUS TO THE RECEPTACLES/FIXTURES, AND SWITCHES. THE GROUNDING CONDUCTOR SHALL BE THE SAME SIZE AS THE CIRCUIT LINE/PHASE CONDUCTORS.

9. ALL WORK AND MATERIALS SHALL BE NEW, U.L. LISTED AND IN ACCORDANCE WITH THE LATEST REVISIONS OF THE NATIONAL ELECTRICAL CODE.

10. IT IS NOT THE INTENTION OF THESE DRAWINGS THAT EVERY FITTING, HANGER, WIRE OR DEVICE BE SHOWN. ALL SUCH ITEMS SHALL BE FURNISHED AND INSTALLED AS NECESSARY FOR A COMPLETE ELECTRICAL SYSTEM COMFORMING TO THE LATEST APPLICABLE LOCAL CODES AND THE NATIONAL ELECTRICAL CODE.

11. USE OF MANUFACTURER AND CATALOG NUMBERS ARE INTENDED TO CONVEY QUALITY AND TYPE OF MATERIAL REQUIRED. ALL MATERIAL IS SPECIFIED "OR APPROVED EQUAL" UNLESS NOTED. ALTERNATES MAY BE USED IF APPROVED BY ENGINEER.

13. MINIMUM SIZE OF RIGID CONDUIT SHALL BE $^{3}/_{4}$" EXCEPT FOR LIGHTING FIXTURE STEMS (PENDANTS) WHICH MAY BE $^{1}/_{2}$" RIGID GALVANIZED STEEL (RGS).

14. CONDUITS SHALL BE SIZED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC). THE EXACT CONDUIT ROUTING AND ARRANGEMENT WITHIN CONDUIT GROUPS SHALL BE DETERMINED BY THE ELECTRICAL CONTRACTOR. THE SUPPORTS FOR METALLIC CONDUIT ARE TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR, AT INTERVALS NOT TO EXCEED 10'-0". WHERE CONDUITS ARE TO BE ROUTED BELOW CABLE TRAYS, THE CONDUITS SHALL BE SUPPORTED BELOW THE LOWEST TRAY. CONDUIT SHALL NOT BE SUPPORTED FROM PIPE HANGERS. CONDUITS SHALL BE INSTALLED PARALLEL TO OR PERPENDICULAR TO WALLS, STRUCTURAL MEMBERS OR THE INTERSECTION OF VERTICAL PLANES AND CEILINGS UNLESS SPECIFICALLY SHOWN OTHERWISE ON THE DRAWINGS. THE MINIMUM HEADROOM FOR ALL CONDUIT RUNS (INCLUDING SUPPORT MATERIALS) SHALL BE 6'-9" . TO ALLOW FOR INSTALLATION OF INSULATION AND EXPANSION, ROUTE CONDUIT PER FOLLOWING MINIMUM CLEARANCES:

    * DUCTS 14" CLEARANCE
    * PIPING 18" CLEARANCE

15. WHERE OPENINGS THROUGH GRATING ARE REQUIRED, THEY SHALL BE FINISHED IN A NEAT AND WORKMANLIKE MANNER BY WELDING A $^{1}/_{4}$" STEEL BAND TO GRATING BARS AROUND OPENING. WHERE GRATING IS GALVANIZED, AFTER WELDING IS COMPLETED, THE SURFACES SHALL BE TOUCHED UP WITH A ZINC RICH COATING.

16. RACEWAYS OR CONDUITS CROSSING BUILDING OR STRUCTURAL EXPANSION JOINTS, SHALL BE PROVIDED WITH SUITABLE EXPANSION FITTINGS. THESE FITTINGS SHALL BE INSTALLED IN A MANNER THAT WILL ENSURE GROUND PATH CONTINUITY IN EACH CONDUIT OR RACEWAY. FOR ALL CONDUITS PENETRATING WALLS OR FLOORS ABOVE THE GROUND FLOOR, THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING NECESSARY BLOCKOUTS OR PIPE SLEEVES FOR CONDUIT PENETRATION, WHETHER OR NOT THEY ARE SHOWN ON THE DRAWINGS. THIS WORK SHALL BE COORDINATED WITH THE CONCRETE POUR TO ELIMINATE AS MUCH CORE DRILLING AS POSSIBLE

17. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ADDITIONAL PULL POINTS (PULL SLEEVES, WIREWAYS OR PULL BOXES) WHERE REQUIRED TO LIMIT THE NUMBER OF 90 DEGREE BENDS TO THE REQUIREMENTS OF THE NEC. PULL BOXES SHALL BE FURNISHED BY THE ELECTRICAL CONTRACTOR AND SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH NEC

18. ALL CONDUITS ENTERING HAZARDOUS AREAS SHALL BE PROVIDED WITH CONDUIT SEALS OR RACEWAY ARRANGEMENT IN ACCORDANCE WITH THE NEC.

19. EXCEPT FOR TERMINATIONS AT EQUIPMENT WITH HUBS, ALL METAL CONDUIT SHALL BE TERMINATED WITH AN INSULATING BUSHING PRIOR TO PULLING CABLE.
    * A GROUNDING TYPE BUSHING SHALL BE USED FOR CONDUITS ENTERING EQUIPMENT.
    * AN UNGROUNDED TYPE BUSHING SHALL BE USED FOR CONDUITS TERMINATING AT EQUIPMENT WITH DOUBLE LOCKNUTS. WHEN CONCENTRIC OR ECCENTRIC CONDUIT KNOCKOUTS ARE USED IN DEVICES OR EQUIPMENT, IN ADDITION TO PROVIDING DOUBLE LOCKNUTS, THE CONTRACTOR SHALL TERMINATE THE CONDUIT USING A PROPERLY GROUNDED BUSHING.

20. LIGHTING AND RECEPTACLE CIRCUITS SHALL NOT BE INSTALLED IN CABLE TRAYS.

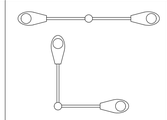
21. FIXTURE STEMS (PENDANTS) SHALL NOT EXCEED 10'-0" IN LENGTH, EXCEPT WHERE NOTED. ADDITIONAL SUPPORTING STRUCTURE SHALL BE PROVIDED WHERE REQUIRED.

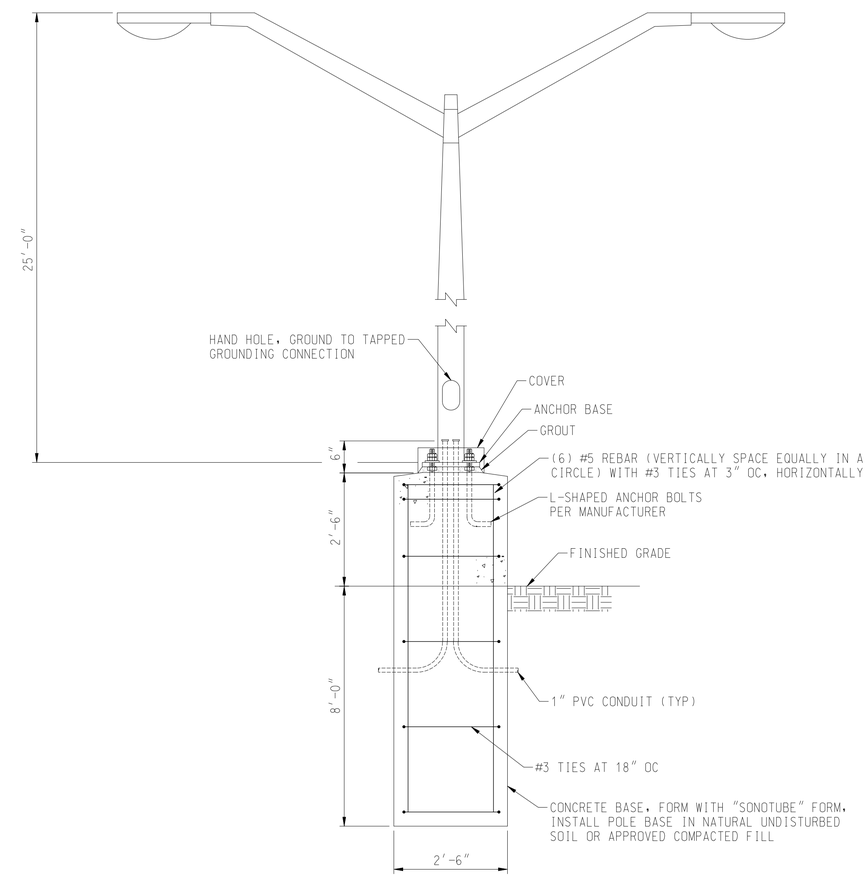
22. ALL DIRECT BURIAL SERVICE ENTRANCE, FEEDER AND BRANCH-CIRCUIT WIRING SHALL BE OF AN APPROVED TYPE IN ACCORDANCE WITH PROVISIONS OF THE NEC.

23. UPON COMPLETION OF LIGHTING SYSTEM, ENERGY OPERATIONS WILL PROVIDE SITE SURVEY AND AREAS REQUIRING ADDITIONAL LIGHTING SHALL BE MODIFIED ACCORDINGLY.

24. ALL OUTDOOR LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTACTOR GROUPS INCLUDING POWER BLOCK AREA LIGHTING, POWER BLOCK EQUIPMENT LIGHTING, SOLAR FIELD STEAM DRUM AREA LIGHTING AND SOLAR FIELD PERIMETER SECURITY LIGHTING. EACH GROUP SHALL BE INDEPENDENTLY CONTROLLED WITH A HAND-OFF-AUTO SWITCH. AREA LIGHTING AND EQUIPMENT LIGHTING SHALL BE AUTOMATICALLY CONTROLLED WITH A PHOTOELECTRIC CELL. SOLAR FIELD PERIMETER SECURITY LIGHTING SHALL BE AUTOMATICALLY CONTROLLED VIA THE PLANT SECURITY SYSTEM. ELEVATED EQUIPMENT LIGHTING IN THE POWER BLOCK SHALL BE FURTHER CONTROLLED BY LOCAL SWITCHES.

LIGHTING FIXTURE SCHEDULE

LABEL	SYMBOL	MANUFACTURER & CATALOG NUMBER	DESCRIPTION	QUANTITY	APPROX MOUNT HEIGHT (UNLESS NOTED OTHERWISE)
A1		LITHONIA CHM SERIES CHM 250M FL 480 SCWA LPI	SOLAR FIELD PERIMETER SECURITY LIGHTING 250W METAL HALIDE OUTDOOR POLE-MOUNT ROADWAY LIGHTING (FLAT TEMPERED GLASS LENS) WITH PULSE START	46	25'-0"
A2				4	25'-0"
B		LITHONIA KAD SERIES DAD 250S 240 SPD04 LPI	POWER BLOCK AREA LIGHTING (FULL CUTOFF) 250W HIGH PRESSURE SODIUM OUTDOOR POLE MOUNT AREA LIGHTING	17	25'-0"
C		LITHONIA TWAC SERIES TWAC 100S 240 LPI	POWER BLOCK AND SOLAR FIELD AREA LIGHTING (FULL CUTOFF) 100W HIGH PRESSURE SODIUM OUTDOOR WALL MOUNT AREA LIGHTING	21	VARIABLE
D		CROUSE-HINDS VMV SERIES VMV-(PART NUMBER AS REQUIRED)	POWER BLOCK EQUIPMENT LIGHTING (SHIELDED AND DIRECTED, AND SWITCHED WHEN ELEVATED) INDUSTRIAL HIGH PRESSURE SODIUM OUTDOOR EQUIPMENT LIGHTING	TBD	VARIABLE



TYPICAL SOLAR FIELD PERIMETER POLE MOUNTED FIXTURE DETAIL

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD	REFERENCE DRAWINGS
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ	E9-10 SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08
SCALE:	NONE	

FOR 22x34 DWG ONLY

POWER ENGINEERS

AUSRA

CARRIZO ENERGY SOLAR FARM

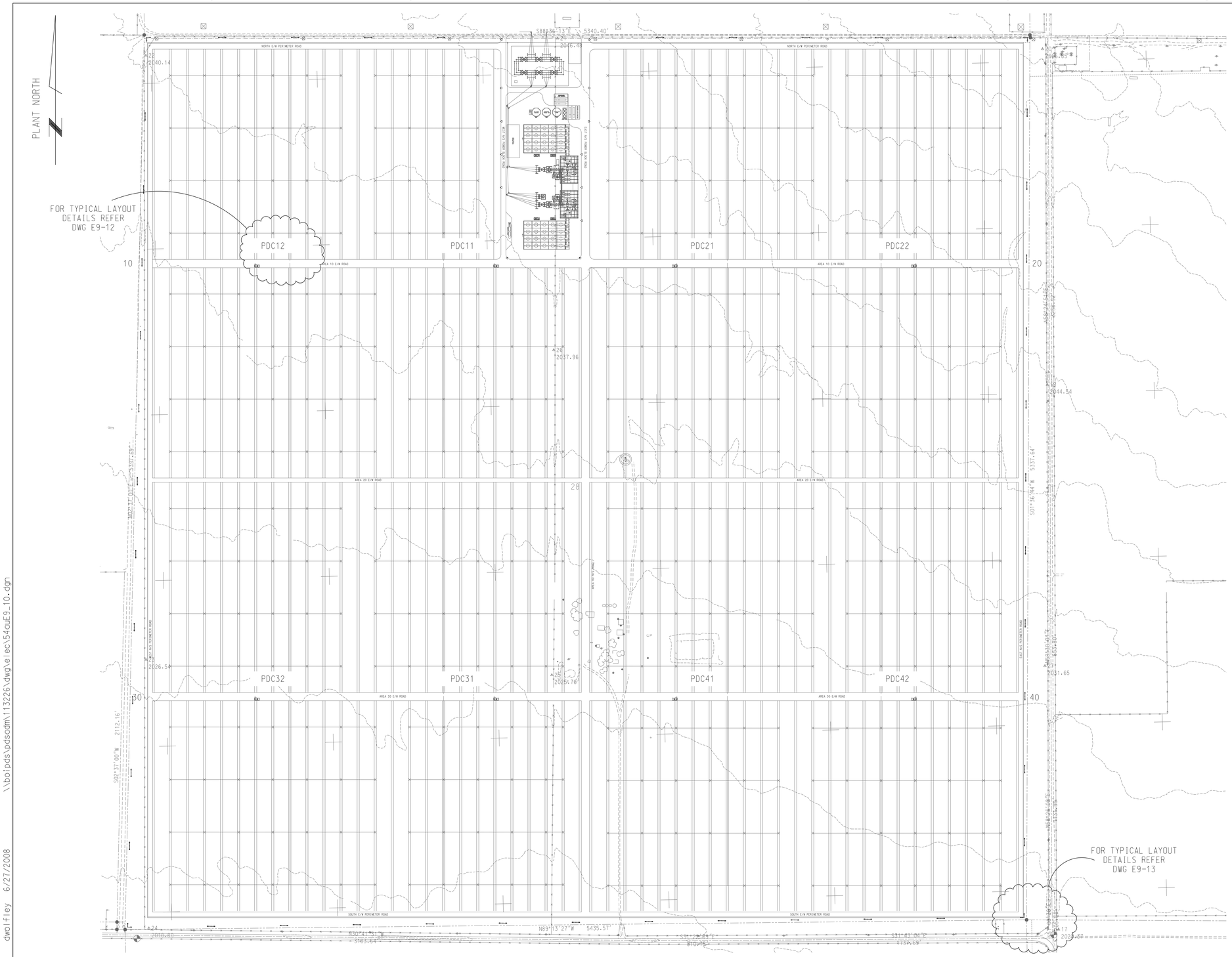
ELECTRICAL LIGHTING DETAILS, GENERAL NOTES, AND LEGEND

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-1

dwolfley 6/27/2008 \\BOIPDS\pdsadm\113226\dwg\elec\54aue9_1.dgn



THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-11	POWER BLOCK PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1" = 300'

FOR 22x34 DWG ONLY

POWER ENGINEERS

AUSRA

CARRIZO ENERGY SOLAR FARM

ELECTRICAL LIGHTING
SITE SECURITY PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-10

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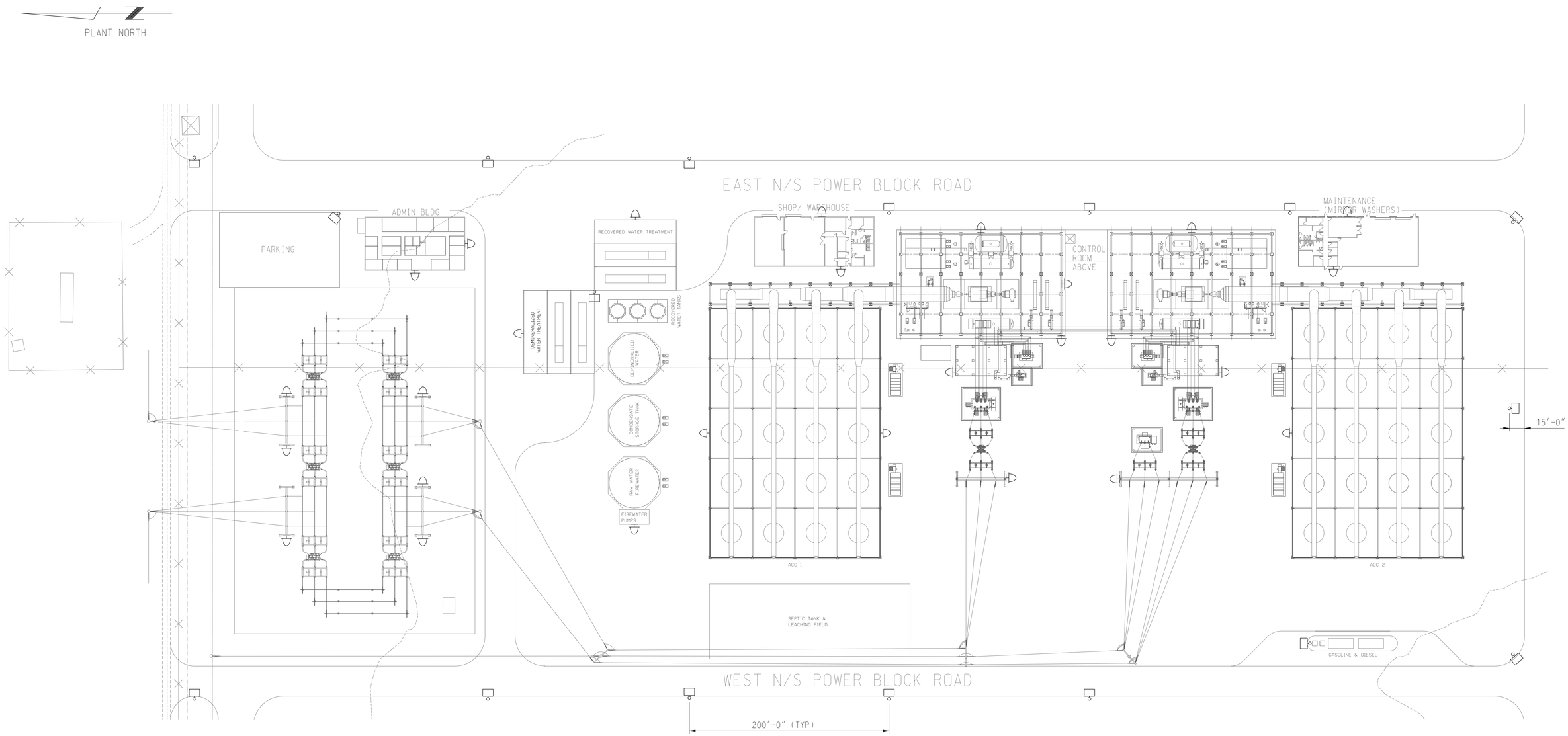


NOTES

1. EQUIPMENT LIGHTING AND BUILDING LIGHTING REQUIREMENTS ARE NOT PROVIDED ON THIS DRAWING.

0 25 50 100 150 FEET

1" = 50'

dwolfley 6/27/2008 \\boipds\pdsadm\113226\dwg\elec\54aUE9_11.dgn

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-10	SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1" = 50'

FOR 22x34 DWG ONLY

POWER ENGINEERS

AUSRA

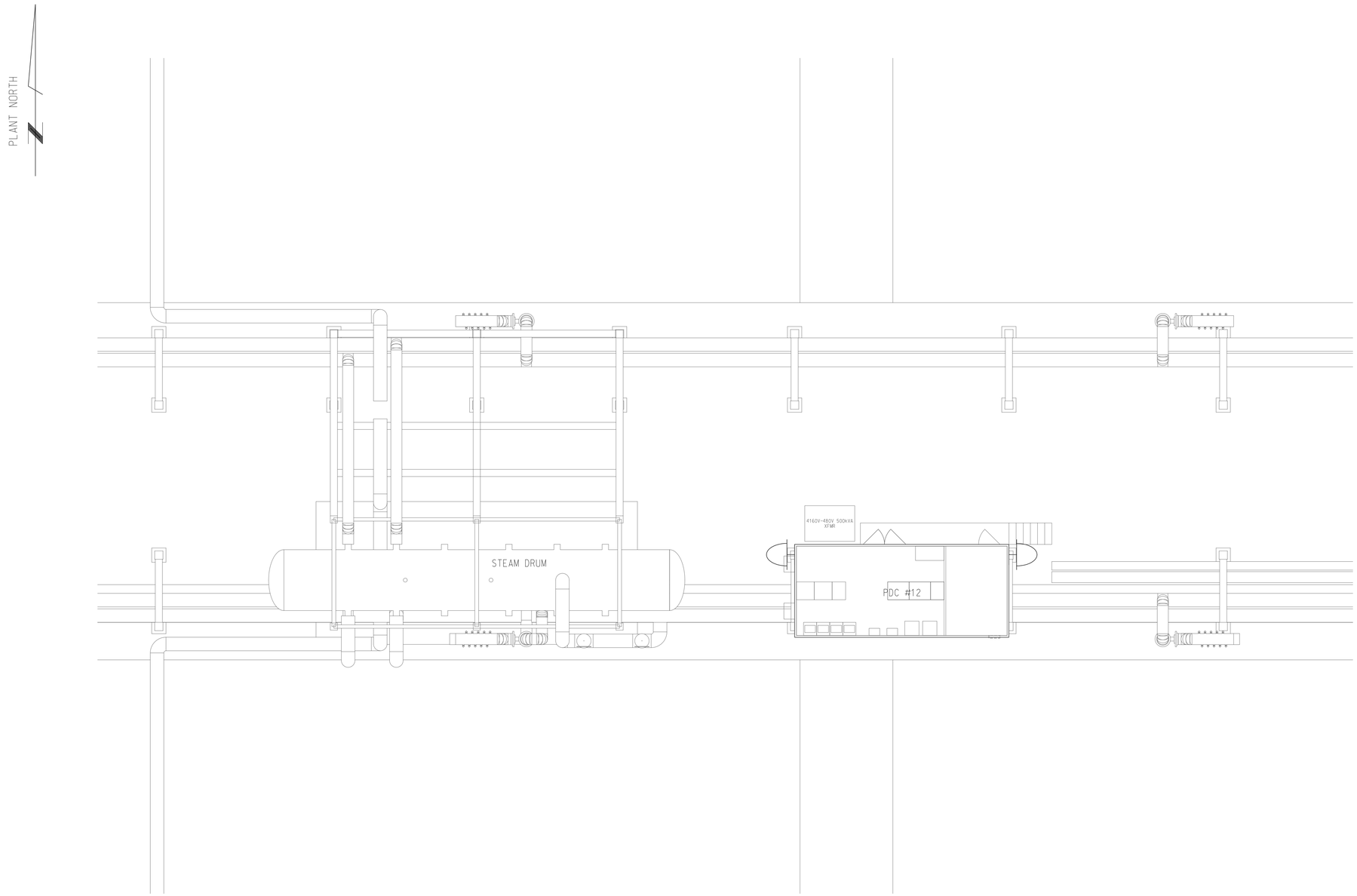
CARRIZO ENERGY SOLAR FARM

ELECTRICAL AREA LIGHTING
POWER BLOCK PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-11



NOTES

1. EQUIPMENT LIGHTING AND BUILDING LIGHTING REQUIREMENTS ARE NOT PROVIDED ON THIS DRAWING.

0 5 10 20 FEET

1/8"= 1'- 0"

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INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-10	SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1/8" = 1'-0'

FOR 22x34 DWG ONLY

POWER ENGINEERS

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CARRIZO ENERGY SOLAR FARM

ELECTRICAL AREA LIGHTING
STEAM DRUM PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-12

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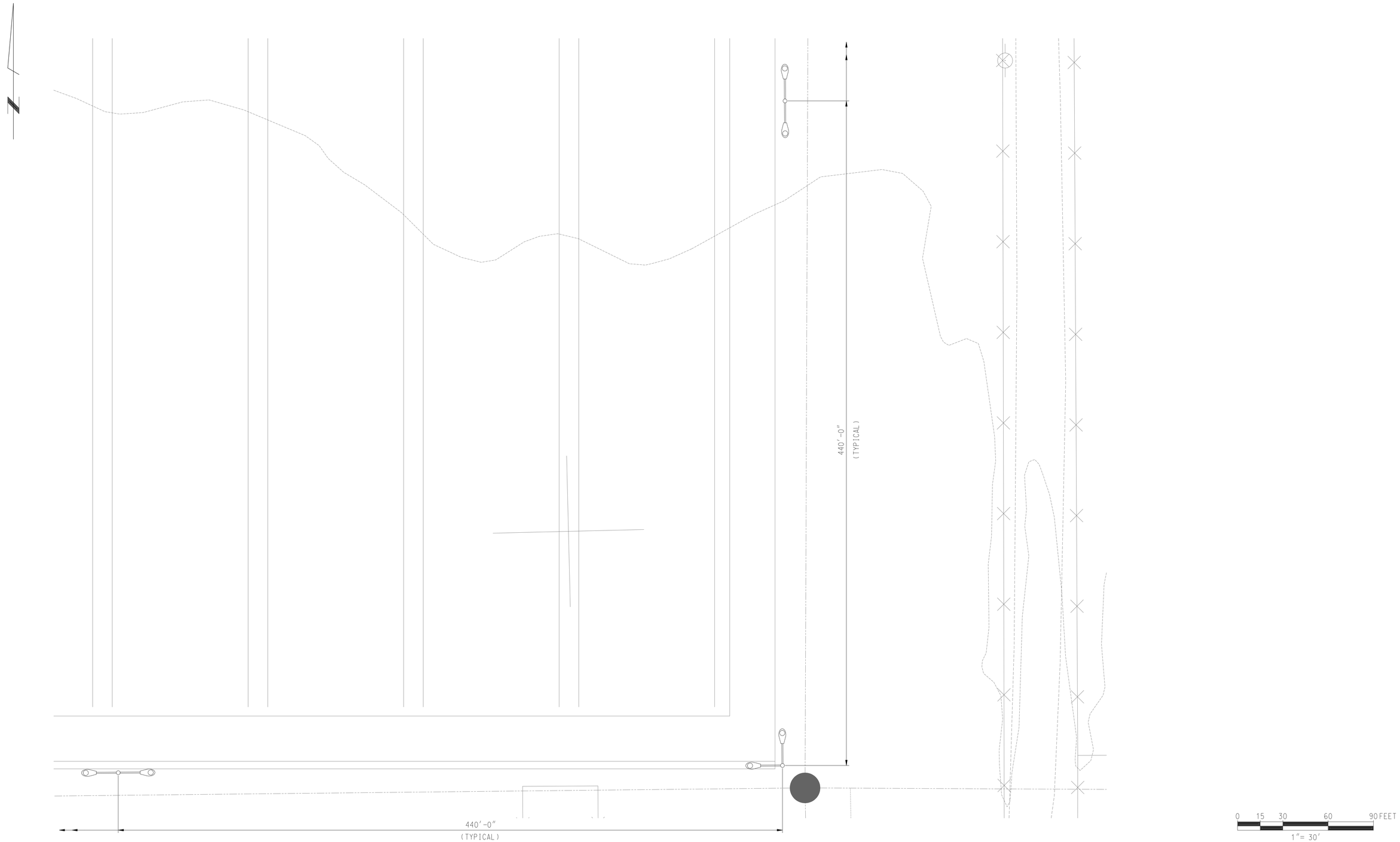

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-10	SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1" = 30'

FOR 22x34 DWG ONLY

POWER ENGINEERS

AUSRA

CARRIZO ENERGY SOLAR FARM

ELECTRICAL LIGHTING
SITE SECUITY DETAIL PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-13

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Carrizo Energy Solar Farm

1. Outdoor general area lighting will utilize High Pressure Sodium lights with IES cutoff distribution optics.

2. Open area lighting will utilize pole-mounted fixtures; see attached Lithoina type “KAD” fixture cutsheet.

3. Wall mounted fixtures will be utilized where a building or structure exists that can be used to mount the fixture see attached Lithonia type “TWAC” fixtures cutsheet.

4. For open areas where poles are required, the fixture will be mounted 20 to 22 feet above grade.

5. Outdoor process area lighting will utilize High Pressure Sodium lights suitable for the environmental conditions. Environmental conditions that apply include Class 1, Division 2, Group D flammable vapor hazardous areas, high ambient temperatures, and vibration. Based on these conditions and industrial fixture is required. See attached Crouse-Hinds Champ VMV series fixture cutsheets. To control the distribution of the light, Dome and 30^0 Angle reflectors will be used on all outdoor VMV series fixtures.

LITHONIA LIGHTING®

Catalog Number	
Notes	Type

FEATURES & SPECIFICATIONS

INTENDED USE — Ideal for parking areas, street lighting, walkways and car lots.

CONSTRUCTION— Rugged, die-cast, soft corner aluminum housing with 0.12" nominal wall thickness. Extruded 4" soft corner arm for pole or wall mounting is standard. Die-cast door frame has impact-resistant, tempered glass lens that is fully gasketed with one-piece tubular silicone.

FINISH — Standard finish is dark bronze (DDB) polyester powder, with other architectural colors available.

OPTICAL SYSTEM — Anodized, aluminum hydroformed reflectors: IES full cutoff distributions R2 (asymmetric), R3 (asymmetric), R4 (forward throw) and R5S (square). High-performance anodized, segmented aluminum reflectors IES full cutoff distributions SR2 (asymmetric), SR3 (asymmetric) and SR4SC (forward throw, sharp cutoff). Segmented reflectors attach with tool-less fasteners and are rotatable and interchangable.

ELECTRICAL SYSTEM — High-reactance, high power factor ballast for 70/100/150W. Constant-wattage autotransformer for 250/400W. Ballast is copper-wound and 100% factory-tested.

Porcelain, horizontally oriented, mogul-base socket with copper alloy, nickel-plated screw shell and center contact. UL listed 1500W, 600V, 4KV pulse-rated.

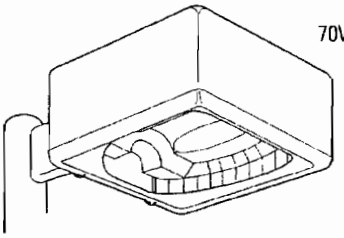
LISTING — UL Listed (standard). CSA Certified (see Options). UL listed for wet locations. IP65 rated in accordance with standard IEC 529.

Soft Square Cutoff Lighting

CONTOUR SERIES

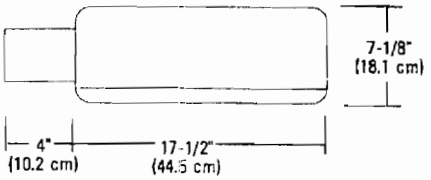
KAD

HIGH PRESSURE SODIUM
70W, 100W, 150W, 250W, 400W
20' to 35' Mounting



Standard Dimensions

EPA: 1.2 ft.^{2}
Weight: 42 lbs (19.1 kg)
Length: 17-1/2" (44.5 cm)
Width: 17-1/2" (44.5 cm)
Depth: 7-1/8" (18.1 cm)



ORDERING INFORMATION

Example: **KAD 400S R2 120 SPD04 LPI**

Choose the boldface catalog nomenclature that best suits your needs and write it on the appropriate line. Order accessories as separate catalog number.

Series

KAD 70S
KAD 100S
KAD 150S
KAD 250S
KAD 400S

Distribution

Hydroformed Reflectors

R2 IES type II asymmetric[1]
R3 IES type III asymmetric[1]
R4 IES type IV forward throw[1]
R5S IES type V square

Segmented Reflectors

SR2 IES type II asymmetric[1]
SR3 IES type III asymmetric[1]
SR4SC IES type IV forward throw

Voltage

120
208[7]
240[7]
277
347
480[7]
TB[2]

Mounting

SPD04 Square pole (4" arm) (standard)
SPD09 Square pole (9" arm)[3]
RPD04 Round pole (4" arm)
RPD09 Round pole (9" arm)[3,4]
WWD04 Wood pole or wall (4" arm)
WWD09 Wood pole or wall (9" arm)[3,4]
WBD04 Wall bracket (4" arm)[4]
WBD09 Wall bracket (9" arm)[4]
L/Arm (When ordering KMA, DAD12)

Shipped Separately

KMA Mast arm adapter
KTMB Twin mounting bar
DAD12P Degree Arm (Pole)
DAD12WB Degree Arm (Wall)

Options

Shipped Installed

SF Single fuse (120, 277, 347V, n/a TB)
DF Double fuse (208, 240, 480V, n/a TB)
LPI Lamp Included as standard
L/LP Less lamp
PER NEMA twist-lock receptacle only (no photocontrol)
QRS Quartz restrike system (250W maximum, lamp not included)
PD Power Tray[8]
WTB Terminal Wiring Block[8]
CSA CSA Certified

Shipped Separately[4]

PE1 NEMA twist-lock PE (120, 208, 240V)
PE3 NEMA twist-lock PE (347V)
PE4 NEMA twist-lock PE (480V)
PE7 NEMA twist-lock PE (277V)
HS House-side shield (R2, R3, R4)
KADVG Vandal guard
KADWG Wire guard

Architectural Colors[5]

Standard Colors

DDB Dark bronze (standard)
DWH White
DBL Black

Classic Colors

DMB Medium bronze
DNA Natural aluminum
DSS Sandstone
DGC Charcoal gray
DTG Tennis green
DBR Bright red
DSB Steel blue

NOTES:
1 House-side shield available.
2 Optional multi-tap ballast (120, 208, 240, 277V).
3 The SPD09, RPD09 or WWD09 must be used when two or more luminaires are oriented on a 90° drilling pattern.
4 May be ordered as accessory.
5 Additional architectural colors available; please see Architectural Colors brochure, form no. 794.3.
6 Must use RPD09.
7 Consult factory for availability in Canada.
8 Only available with SR2, SR3, and SR4SC optics.

Accessories: Tenon Mounting Slipfitter

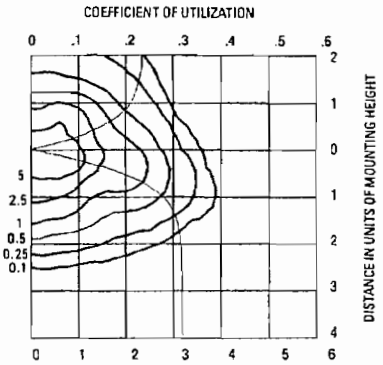
Order as separate catalog number.

	Number of fixtures					
Tenon O.D.	One	Two@180°	Two@90°	Three@120°	Three@90°	Four@90°
2-3/8"	T20-190	T20-280	T20-290[6]	T20-320[6]	T20-390[6]	T20-490[6]
2-7/8"	T25-190	T25-280	T25-290[6]	T25-320	T25-390[6]	T25-490[6]
4"	T35-190	T35-280	T35-290[6]	T35-320	T35-390[6]	T35-490[6]

KAD 400S Arm-mounted Soft Square Cutoff

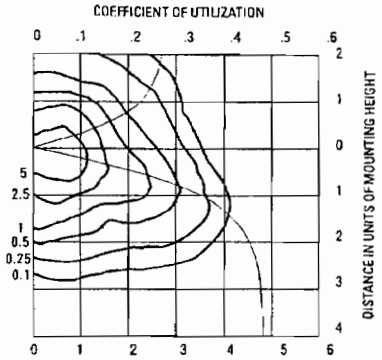
Coefficient of Utilization ———
Initial Footcandles ———

KAD R2 Test no. 1193082501



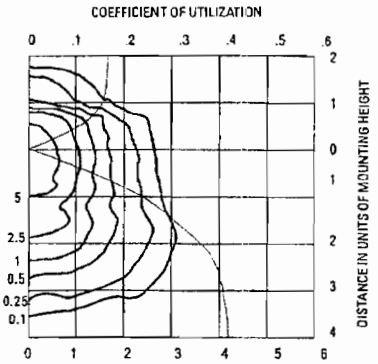
400W High Pressure Sodium lamp, 50,000 rated lumens, Footcandle values based on 30' mounting height, Distribution Type II, cutoff.

KAD R3 Test no. 1192040102



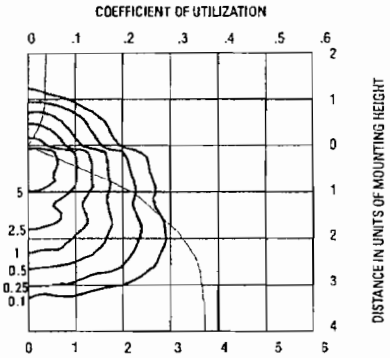
400W High Pressure Sodium lamp, 50,000 rated lumens, Footcandle values based on 30' mounting height, Distribution Type III, cutoff.

KAD R4 Test no. 1191120301



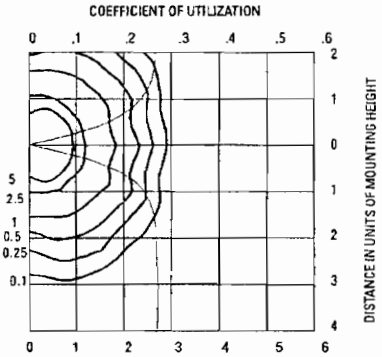
400W High Pressure Sodium lamp, 50,000 rated lumens, Footcandle values based on 30' mounting height, Distribution Type IV, cutoff.

KAD R4HS Test no. 1192041302



400W High Pressure Sodium lamp, 50,000 rated lumens, Footcandle values based on 30' mounting height, Distribution Type IV, cutoff.

KAD R5S Test no. 1194040702



400W High Pressure Sodium lamp, 50,000 rated lumens, Footcandle values based on 30' mounting height, Distribution Type V, cutoff.

ELECTRICAL CHARACTERISTICS

Wattage/ballast	Primary voltage	Line current (amps) start/operating	Primary dropout voltage	Input watts	Power factor (%)	Regulation Line V = Lamp lumens
	120	2.82/4.30	90			
400 CWA	208	1.56/2.48	156			
Autoregulator	240	1.36/2.15	180	465	90+	±10% = ±10%
	277	1.18/1.86	208			
	480	.75/1.10	360			

Tested to current IES and NEMA standards under stabilized laboratory conditions. Various operating factors can cause differences between laboratory data and actual field measurements. Dimensions and specifications on this sheet are based on the most current available data and are subject to change without notice.

Mounting Height Correction Factor

(Multiply the fc level by the correction factor)
25 ft. = 1.44
35 ft. = 0.72
40 ft. = .56

$$\left(\frac{\text{Existing Mounting Height}}{\text{New Mounting Height}}\right)^2 = \text{Correction Factor}$$

Notes:
1 Photometric data for other distributions can be accessed from the Lithonia Lighting website. (www.lithonia.com)

LITHONIA LIGHTING®
An AcuityBrands Company

Lithonia Lighting
Acuity Lighting Group, Inc.
Outdoor
One Lithonia Way, Conyers, GA 30012
Phone: 770-922-9000 Fax: 770-918-1209
In Canada: 160 avenue Labrosse, Point-Claire, P.Q., H9R 1A1
www.lithonia.com

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LITHONIA LIGHTING®

Catalog Number	
Notes	Type

FEATURES & SPECIFICATIONS

INTENDED USE

For entrances, stairwells, corridors and other pedestrian areas.

CONSTRUCTION

Rear housing is rugged, corrosion-resistant, die-cast aluminum. Front cover is one-piece UV-resistant injection molded polycarbonate, internally painted. Captive external hardward is specially treated for corrosion resistance and includes slotted hex-head and tamperproof fasteners.

FINISH

Dark Bronze (DDB) corrosion resistant polyester powder.

OPTICAL SYSTEM

One-piece die-formed reflector is diffused aluminum. Refractor is clear UV stabilized polycarbonate, providing **IES cutoff** distribution and maximum lateral light output. Front cover is sealed and gasketed to inhibit the entrance of outside contaminants.

ELECTRICAL SYSTEM

Ballast is reactor normal power factor, copper wound. HPS ballasts are 100% factory tested and UL listed. Components are heat-sinked directly to the cast housing for maximum heat dissipation (For 50 hertz availability, consult factory.)

Porcelain, horizontally oriented medium-base socket with copper alloy, nickel-plated screw shell and center contact. UL listed 660W, 600V and 4kV pulse rated.

Medium-base lamp included with fixture.

INSTALLATION

Mount to any vertical surface or to a 4" round square outlet box. Back access through gasketed slot. Top wiring access through 1/2" threaded conduit entry. (Through-wiring requires us of a conduit tee). Photocells are field-installable.

LISTING

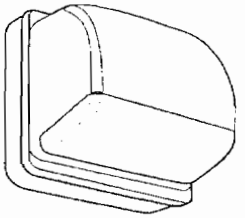
UL listed for wet locations. IP65 listed. Listed and labeled to comply with Canadian and Mexican Standards (see options).

Cutoff Mini-WallPaks

TWAC

HIGH PRESSURE SODIUM

35W, 50W, 70W, 100W



Height: 10" (25.4cm)
Width: 11-1/2" (29.2cm)
Depth: 8-15/16" (22.7cm)
Weight: 10 lbs. (4.53kg)

International Dark Sky Member

ORDERING INFORMATION

Choose the boldface catalog nomenclature that best suits your needs and write it on the appropriate line. Order accessories as separate catalog numbers (shipped separately).

Example: **TWAC 35S 120 LPI**

TWAC

Series	Wattage/ lamp	Voltage
TWAC	35S[1]	120
	50S[2]	208[8]
	70S	240[8]
	100S	277
		347
		TB[3]

Options

Shipped installed in fixture

SF	Single fuse (120, 277, 347V)[4]
DF	Double fuse (208, 240V)[4]
XHP	High power factor ballast
EC	Emergency circuit[5,6]
DC12	Emergency circuit 12 volt (35W lamp included std.)[9]
2DC12	Emergency circuit 12 volt (2 35W lamps included std.)[9]
QRS	Quartz restrike system[5,6]
CR	Enhanced corrosion-resistance
CRT	Non-stick protective coating[7]
CSA	Listed and labeled to comply with Canadian Standards
NOM	Listed and labeled to comply with
PE	Photocell
L/LP	Less lamp
LPI	Lamp included as standard

Architectural Colors (optional)

DNA	Natural aluminum
DBL	Black
DMB	Medium bronze
DWH	White
DSS	Sandstone

NOTES:

1. 120V only.
2. 120 or 277V only.
3. Optional multi-tap ballast (120,208,240,277V) In Canada 120,277,347V; ships as 120/347.
4. Not available with multi-tap ballast.
5. Lamp not included.
6. Quartz lamp wattage not to exceed ballast wattage rating.
7. Black finish on housing only.
8. Consult factory for availability in Canada.
9. Not available with QRS, EC or NOM.

Accessories

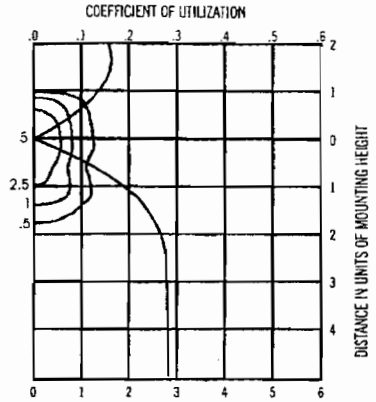
Order as separate catalog number

RK1 PEB1	Photocell kit (120V only)
RK1 PEB1 CSA	Photocell kit (120V only)
RK1 PEB2	Photocell kit (208, 240 or 277V)
RK1 PEB3 CSA	Photocell kit (347V)
TWAWG	Wireguard

TWAC High Pressure Sodium Wall-Pak

TWAC 35S

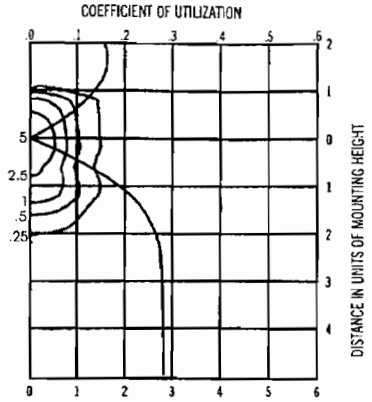
Test No. LTL8358



35W High Pressure Sodium lamp, 4000 rated lumens. Footcandle values based on 20' mounting height, Distribution , cutoff.

TWAC 50S

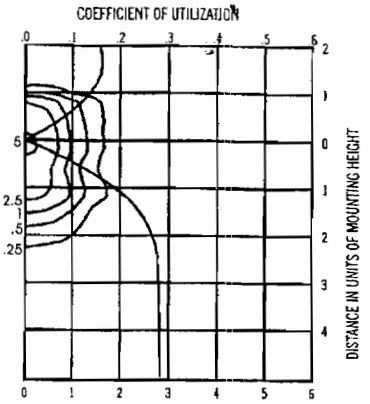
Test No. LTL8357



50W High Pressure Sodium lamp, 6300 rated lumens. Footcandle values based on 20' mounting height, Distribution , cutoff.

TWAC 70S

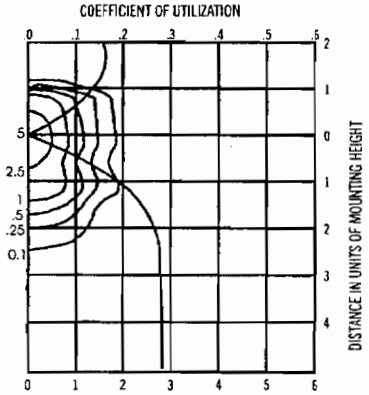
Test No. LTL8356



70W High Pressure Sodium lamp, rated lumens. Footcandle values based on 20' mounting height, Distribution , cutoff.

TWAC 100S

Test No. LTL8337



100W High Pressure Sodium lamp, 9500 rated lumens. Footcandle values based on 20' mounting height, Distribution , cutoff.

Mounting Height Correction Factor

(Multiply the fc level by the correction factor)

6'	8'	10'
8 ft. = 6.25	–	8 ft. = 6.25
10 ft.= 4.00	10 ft.= 4.00	–
12 ft.= 2.78	12 ft.= 2.78	12 ft.= 2.78

LITHONIA LIGHTING®

An AcuityBrands Company

Lithonia Lighting
Acuity Lighting Group, Inc.
Outdoor Lighting
One Lithonia Way, Conyers, GA 30012-3957
Phone: 770-922-9000 Fax: 770-918-1209
In Canada: 160 avenue Labrosse, Point-Claire, P.Q. H9R 1A1
www.lithonia.com

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3L-2 50-175W VMV Series ♦

Champ®
H.I.D. Lighting Fixtures
Enclosed & Gasketed

Cl. I, Div. 2, Groups A,B,C,D
Cl. II, Groups E,F,G (HPS 50W, 70W)
Cl. III (HPS 50W, 70W)
Simultaneous Presence (HPS 50W, 70W)
3,3R,4,4X

Wet Locations
Marine
Locations
NEMA

Application:

VMV series *Champ* lighting fixtures are used:
- in manufacturing plants, refineries, chemical, petrochemical, and other industrial process facilities, waste or sewage treatment facilities, offshore, dockside, and harbor installations, and other heavy industrial applications
- in areas in which ignitible concentrations of flammable gases or vapors will be present only due to abnormal, unusual, or accidental conditions ♦
- where combustible dusts are present ♦ *
- in marine applications where water spray and corrosive atmospheres are considerations
- in elevated ambient temperatures often found in industrial applications
- in installations where moisture, dirt, dust, vibration, corrosion, and rough usage are problems
- wherever the damaging effects of water, wind, snow, sleet, hot sun, or any combination of these elements are found

Features:

- Compact, lightweight design is ideal for medium and low mounting heights
- Cast copper-free aluminum construction (less than 0.4 of 1% copper) and epoxy powder finish provide excellent resistance to corrosion
- Seven mounting arrangements to suit any lighting layout – pendant, flexible pendant, ceiling, wall bracket, angle stanchion, straight stanchion, and quad-mount
- Wide range of light sources and wattages to meet specifiers' needs: 50, 70, 100, and 150 watt high pressure sodium (HPS); 100, and 175 watt mercury vapor (MV); 70, 100, 175 watt metal halide (MH)
- Hinged ballast housing for ease of installation and maintenance
- Wide choice of photometric distributions. Glass globes, refractors and compact refractors available for all wattage fixtures: plastic refractors (for non-hazardous applications only) for 50-100 watt fixtures
- All fixtures are designed to perform in a 40°C ambient temperature. Selected fixtures are suitable for ambient temperatures up to 65°C.
- Superior gasketing seals between the mounting module, housing, and optical assembly for optimum performance in wet and corrosive environments
- Hubs with an integral conduit stop and bushing to help prevent damage to field wiring during installation
- Low ambient capability to (–40°C)
- Dome and 30° angle reflectors made of bright white *Krydon*® material provide superior reflectivity, with twist-on feature requiring no tools or additional hardware. Will not chip, peel, dent, rust, or corrode
- Grounding wire for safety
- Ballasts available in voltages of 120, 208, 240, 277, 347, 480, 600 multi-tap• (dual-tap• for 50W HPS) and tri-tap
- Mogul base porcelain lamp socket

Standard Materials:

- Ballast housings and mountings – copper free aluminum (less than 0.4 of 1%)
- Exterior hardware – stainless steel
- Reflectors (dome and angle) – *Krydon* fiberglass-reinforced polyester material
- Globes – heat and impact resistant internally fluted glass
- Refractors – glass (50-175 watts); plastic (50-100 watts), for non-hazardous applications.
- Guards: globe – copper-free aluminum
  refractor – stainless steel

Standard Finishes:

- Copper-free aluminum – epoxy powder coat
- *Krydon* material – high reflectance white
- Stainless steel – natural

Electrical Ratings:

- 120, 208, 240, 277, 347, 480, 600, Multi-tap• (120, 208, 240 and 277)
- 50 to 150W HPS; 100 to 175W MV; 70 to 175W MH

Certifications and Compliances:

- NEC: Class I, Division 2, Groups A,B,C,D – All;
  Class II, Division 1, Groups E,F,G; 50-70W HPS only.
  Simultaneous Presence (Class I, Division 2/Class II, Division 1) – 50-70W HPS only.
  Class III 50-70W HPS only.
- CEC: Class I, Division 2, Groups A,B,C,D -All
  Class II, Groups E,F,G – All
  Class III – All
- UL Standards: 595 Marine Locations: 844 Hazardous (Classified) Locations: 1572 Ordinary and Wet Locations
- CSA Standard: C22.2 No. 137

(Note: CEC/CSA Certified VMV Champ® HID lighting - Crouse-Hinds Canada fixtures only.)

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Options:

The following special options are available from the factory by adding suffix to fixture Cat. No.:

Description	Suffix to be added to Cat. No.
• Fused – to protect ballast and capacitors against abnormal line conditions	S658Ⓘ
• Ballast-Gard™ starter cut-out switch – prevents starter pulsing when lamp is cycling or inoperative; prolongs ballast and ignitor life. Available for use with 50-150W LX HPS only	BG
• Instant restrike – enables a hot HPS lamp to immediately restrike after a momentary loss of arc due to voltage fluctuation or power outage. It has no effect on the warm-up period of cold lamps. Available for use with 50-150W LX HPS only	IR
• Quartz auxiliary lighting for use with R2 & R5 large glass refractors only! – comes to full brightness immediately and remains lit until the HID lamp attains 60-70% of full illumination. For *non-hazardous* locations only	QTZ†
• Stainless steel insert - top hat with stainless steel threaded insert to attach ballast housing	S806
• TEFLON coating on globe for increased shatter protection. (VMV T #S do not change)	S808
• Factory assembled with H.I.D. lamps installed for additional labor savings	FA

(Note: BG and IR options cannot be used together. IR and QTZ options cannot be used together.)

- Restricted Breathing Construction
  -Class I Zone 2 suitability
  -Cooler T-Ratings for Class I Div 2 ... S826

Accessories:

- See pages 3L-35 and 36 for complete listing.
- See page L-18 for family trees.

♦ See page 3L-0.
* NEC - US Fixtures (UL) - Class II, Class III, Simultaneous Presence - 50 & 70 watt HPS only.
• CEC - Canada Fixtures (CSA) - Class II, Class III - All lamp types and wattages.
† Quartz lamp not included use 100W single ended lamp – Q100DC, Q100CL/DC or 100Q/CL/DC. Consult factory for top-hat limitations.
Ⓘ CSA certified fixtures are not available with fusing.
• CSA certified fixtures are not available with multi-tap or dual-tap ballast. CSA certified fixtures available with tri-tap ballasts.
TEFLON is a registered trademark of E.I. duPont Co.

50-150W High Pressure Sodium VMV Series

Champ® H.I.D. Lighting Fixtures Integral Ballast Enclosed & Gasketed

Cl. I, Div. 2, Groups A,B,C,D ♦ — Wet Locations
Cl. II, Groups E,F,G ♦ * (HPS 50W, 70W) — Marine Locations
Cl. III ♦ * (HPS 50W, 70W) — NEMA 3,3R,4,4X
Simultaneous Presence ♦ * (HPS 50W, 70W)

CROUSE-HINDS

High Pressure Sodium

High Power Factor Ballast (Min. P.F. 90%) – See Notes 1 (to specify voltage) and 2

Mounting Style	Hub Size	Lamp Watts[1]	With G24 Globe and P21 Guard Cat. No.†	With G241 Type I Compact Refractor Cat. No.**	With G245 Type V Compact Refractor Cat. No.**	With R5 Glass Refractor‡ Cat. No.***
Pendant Mount	¾	50	VMVS2A050GP	VMVS2A050G241	VMVS2A050G245	VMVS2A050R5
	1		VMVS3A050GP	VMVS3A050G241	VMVS3A050G245	VMVS3A050R5
	¾	70	VMVS2A070GP	VMVS2A070G241	VMVS2A070G245	VMVS2A070R5
	1		VMVS3A070GP	VMVS3A070G241	VMVS3A070G245	VMVS3A070R5
	¾	100	VMVS2A100GP	VMVS2A100G241	VMVS2A100G245	VMVS2A100R5
	1		VMVS3A100GP	VMVS3A100G241	VMVS3A100G245	VMVS3A100R5
	¾	150	VMVS2A150GP	VMVS2A150G241	VMVS2A150G245	VMVS2A150R5
	1		VMVS3A150GP	VMVS3A150G241	VMVS3A150G245	VMVS3A150R5
Flexible Pendant Mount	¾	50	VMVS2HA050GP	VMVS2HA050G241	VMVS2HA050G245	VMVS2HA050R5
	¾	70	VMVS2HA070GP	VMVS2HA070G241	VMVS2HA070G245	VMVS2HA070R5
	¾	100	VMVS2HA100GP	VMVS2HA100G241	VMVS2HA100G245	VMVS2HA100R5
	¾	150	VMVS2HA150GP	VMVS2HA150G241	VMVS2HA150G245	VMVS2HA150R5
Ceiling Mount Thru-Feed	¾	50	VMVS2C050GP	VMVS2C050G241	VMVS2C050G245	VMVS2C050R5
	1		VMVS3C050GP	VMVS3C050G241	VMVS3C050G245	VMVS3C050R5
	¾	70	VMVS2C070GP	VMVS2C070G241	VMVS2C070G245	VMVS2C070R5
	1		VMVS3C070GP	VMVS3C070G241	VMVS3C070G245	VMVS3C070R5
	¾	100	VMVS2C100GP	VMVS2C100G241	VMVS2C100G245	VMVS2C100R5
	1		VMVS3C100GP	VMVS3C100G241	VMVS3C100G245	VMVS3C100R5
	¾	150	VMVS2C150GP	VMVS2C150G241	VMVS2C150G245	VMVS2C150R5
	1		VMVS3C150GP	VMVS3C150G241	VMVS3C150G245	VMVS3C150R5
Wall Mount Thru-Feed	¾	50	VMVS2TW050GP	VMVS2TW050G241	VMVS2TW050G245	VMVS2TW050R5
	1		VMVS3TW050GP	VMVS3TW050G241	VMVS3TW050G245	VMVS3TW050R5
	¾	70	VMVS2TW070GP	VMVS2TW070G241	VMVS2TW070G245	VMVS2TW070R5
	1		VMVS3TW070GP	VMVS3TW070G241	VMVS3TW070G245	VMVS3TW070R5
	¾	100	VMVS2TW100GP	VMVS2TW100G241	VMVS2TW100G245	VMVS2TW100R5
	1		VMVS3TW100GP	VMVS3TW100G241	VMVS3TW100G245	VMVS3TW100R5
	¾	150	VMVS2TW150GP	VMVS2TW150G241	VMVS2TW150G245	VMVS2TW150R5
	1		VMVS3TW150GP	VMVS3TW150G241	VMVS3TW150G245	VMVS3TW150R5
Quad-Mount Pendant, Adjustable Thru-Feed, 25° Angle, 12½° Angle	¾	50	VMVS25Q050GP	VMVS25Q050G241	VMVS25Q050G245	VMVS25Q050R5
	¾	70	VMVS25Q070GP	VMVS25Q070G241	VMVS25Q070G245	VMVS25Q070R5
	¾	100	VMVS25Q100GP	VMVS25Q100G241	VMVS25Q100G245	VMVS25Q100R5
	¾	150	VMVS25Q150GP	VMVS25Q150G241	VMVS25Q150G245	VMVS25Q150R5
Stanchion Mount 25° Angle	1½	50	VMVSJ050GP	VMVSJ050G241	VMVSJ050G245	VMVSJ050R5
	1½	70	VMVSJ070GP	VMVSJ070G241	VMVSJ070G245	VMVSJ070R5
	1½	100	VMVSJ100GP	VMVSJ100G241	VMVSJ100G245	VMVSJ100R5
	1½	150	VMVSJ150GP	VMVSJ150G241	VMVSJ150G245	VMVSJ150R5
Stanchion Mount Straight	1½	50	VMVSP050GP	VMVSP050G241	VMVSP050G245	VMVSP050R5
	1½	70	VMVSP070GP	VMVSP070G241	VMVSP070G245	VMVSP070R5
	1½	100	VMVSP100GP	VMVSP100G241	VMVSP100G245	VMVSP100R5
	1½	150	VMVSP150GP	VMVSP150G241	VMVSP150G245	VMVSP150R5

NOTES:
1. Catalog numbers are basic numbers. Voltage must be specified.

Voltage	120	208	240	277	347	480	600	Multi-Tap*	Tri-Tap
Suffix	/120	/208	/240	/277	/347	/480	/600	/MT*	/TT

50W HPS fixtures are only available with a 120/277 volt dual-tap ballast. To specify voltage, add suffix DT. (Multi-tap ballasts are pre-wired for 277V.)
2. For 150W HPS fixtures, "LX" or "CE" must be specified. To specify for use with 55V lamp, add suffix "LX." To specify for use with 100V lamp, add suffix "CE." ONLY LX suffix available from Crouse-Hinds Canada.
* CSA certified fixtures are not available with multi-tap ballasts.

† To obtain fixture without guard, omit suffix "P" from Cat. No.
** Available with optional wire guard. Order "P241" wire guard separately.
*** Available with optional wire guard. Order "P23" wire guard separately.
Accessories – see pages 3L-35 and 36 for complete listing.
Ballast Data – see pages 3L-39 to 42 for replacement ballasts.
♦ See page 3L-0.
* NEC – US Fixtures (UL) – Class II, Class III, Simultaneous Presence – 50 & 70 watt HPS only.
* CEC – Canada Fixtures (CSA) – Class II, Class III – All wattages.
‡ To substitute IES Type II refractor in place of Type V, change "R5" to "R2" in catalog number. R2 & R5 refractors not suitable for marine applications.

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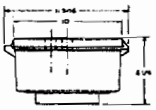
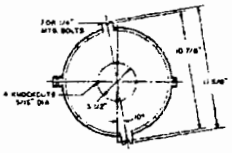
50-175W VMV Series

Champ® H.I.D. Lighting Fixtures Integral Ballast Enclosed & Gasketed

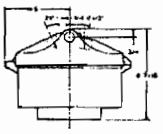
Pendant Mount



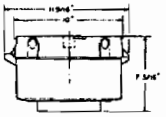
Ceiling Mount Top View



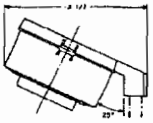
Quad-Mount



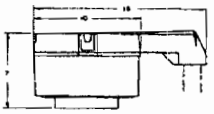
Ceiling Mount



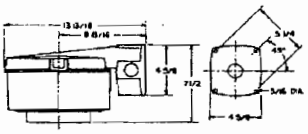
25° Angle Stanchion Mount



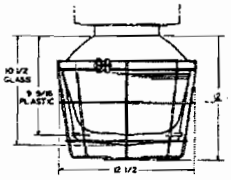
Straight Stanchion Mount



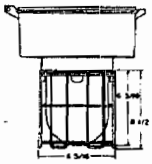
Wall Mount



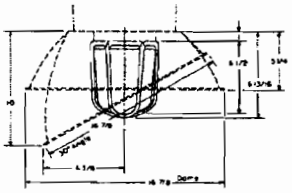
Fixture With: Refractors, Guard



Compact Refractor



Globe, Guard, Reflectors



Temperature Performance Data

Lamp Watts	Ambient Temp °C	Class I Division 2 Globe, S866&Guard/RS Series Refractor				*Class II Division 1 and 2 Globe&Guard	Simultaneous Presence Class I, Division 2/Class II Globe&Guard	Supply Wire °C
High Pressure Sodium:								
50	40	T3A	T3C	T3B	T4	T4A	T3/T4A	75
	55	T3A	—	T3A	—	T4	T3/T4	75
	65	T3	—	T3	—	—	—	75
70	40	T3	T3A	T3B	T3C	T3C	T2D/T3C	75
	55	T3	—	T3	—	T3C	T2C/T3C	90
	65	—	—	—	—	—	—	—
100	40	T2C	T2C	T2D	T2D	—	—	90
	55	—	—	—	—	—	—	—
	65	—	—	—	—	—	—	—
150	40	T2A	T2B	T2B	T2C	—	—	90
	55	—	—	—	—	—	—	—
	65	—	—	—	—	—	—	—
Mercury Vapor:								
100	40	T2B	T2B	T2C	T2B	—	—	75
	55	—	—	—	—	—	—	—
	65	—	—	—	—	—	—	—
175	40	T2	T2A	T2B	T2B	—	—	90
	55	—	—	—	—	—	—	—
	65	—	—	—	—	—	—	—
Metal Halide:								
70	40	T3A	T3A	T3A	—	—	—	75
	55	T3	T3	T3	—	—	—	90
	65	—	T3	—	—	—	—	—
100	40	T2D	T2D	T2D	—	—	—	75
	55	T2D	T2D	T2D	—	—	—	85
	65	—	—	—	—	—	—	—
175	40	T2A	T2A	T2B	T2B	—	—	90
	55	—	—	T2A	—	—	—	—
	65	—	—	—	—	—	—	—

(Data not applicable with QTZ suffix)

Net Fixture Weights (lbs.):

Fixture Series	Lamp Watts 50	70	100	150	175
Fixture with Globe, Guards (lbs):					
VMVS	13½	14½	14½	14½	
VMVC			13¼		15½
VMVM		13	13¼		15½
Fixture with Glass Refractor (lbs):					
VMVS	21¾	22¾	22¾	22¾	
VMVC			21½		23¾
VMVM		21	21½		23¾

Add for mounting modules (lbs):

Pendant	1¼	Quad-Mount	3½
Flexible Pendant	1½	Angle Stanchion	3½
Ceiling	2¾	Straight Stanchion	4½
Wall	4½		

Add for reflectors (lbs):

Dome	1½	30° Angle	1½

Deduct: ½ lb. for fixture without P21 Guard

* • NEC – US Fixtures (UL) – Class II, Class III, Simultaneous Presence – 50 & 70 watt HPS only.
• CEC – Canada Fixtures (CSA) – Class II, Class III – All lamp types and wattages.

CSA T-Rating CSA testing for T #'s is to different standards than UL.

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VMV, LMV, DMV, VMV High Wattage & N2MV Series

Globes

G54

G24

G303

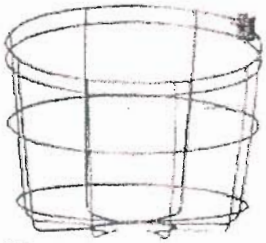
Lamp Watts	Fixture Series	Type	Cat. #
35-150	LMVS, LMVM	Heat/impact resistant	G54
50-175	VMVC, VMVM, VMVS	Heat/impact resistant	G24
50-250	DMVC, DMVM, DMVS	Heat/impact resistant	G303
200-400	VMVS	Heat/impact resistant	G303
250	VMVC, VMVM	Heat/impact resistant	G303
50-175	N2MVC, N2MVM, N2MVS	Heat/impact resistant	G303

Guards

P50 – use with G54 globe

P21 – use with G24 globe

P33 – use with G303 globe


P23 – use with *refractors*

Lamp Watts	Fixture Series	Type	Cat. #
35-150	LMVS, LMVM	Copper-free aluminum	P50
50-175	VMVC, VMVM, VMVS	Copper-free aluminum	P21
50-250	DMVC, DMVM, DMVS	Stainless steel	P33
200-400	VMVS	Stainless steel	P33
250	VMVC, VMVM	Stainless steel	P33
Refractors	All	Stainless steel	P23
50-175	N2MVC, N2MVM, N2MVS	Stainless steel	P33

Reflectors

Dome – Krydon* material

30° Angle – Krydon material

Lamp Watts	Fixture Series	Dome Cat. #	Angle Cat. #
35-150	LMVS, LMVM	RD636 (RD66)	RA636 (RA66)
50-175	VMVC, VMVM, VMVS	RD70	RA70
50-250	DMVC, DMVM, DMVS	RD739 (RD79)	RA739 (RA79)
200-400	VMVS	RD739 (RD79)	RA739 (RA79)
250	VMVC, VMVM	RD739 (RD79)	RA739 (RA79)
50-175	N2MV, N2MVF(B)	RD739	RA740

Reflector/Lens – Etched Alzak aluminum reflector/tempered glass lens

Lamp Watts	Fixture Series	Type	Cat. #
200-400	VMVC, VMVM, VMVS	Reflector/Lens	GRD4
70-250	DMVS, DMVC, DMVM	Reflector/Lens	GRD4

Globes – Teflon Coated

Teflon coated for increased shatter protection

Lamp Watts	Fixture Series	Cat. #
50-175	VMVC, VMVM, VMVS	G24-S808
50-175	DMVC, DMVM, DMVS	G303-S808

Alzak is a registered trademark of Alcoa.
*Teflon is a registered trademark of E.I. DuPont Co.

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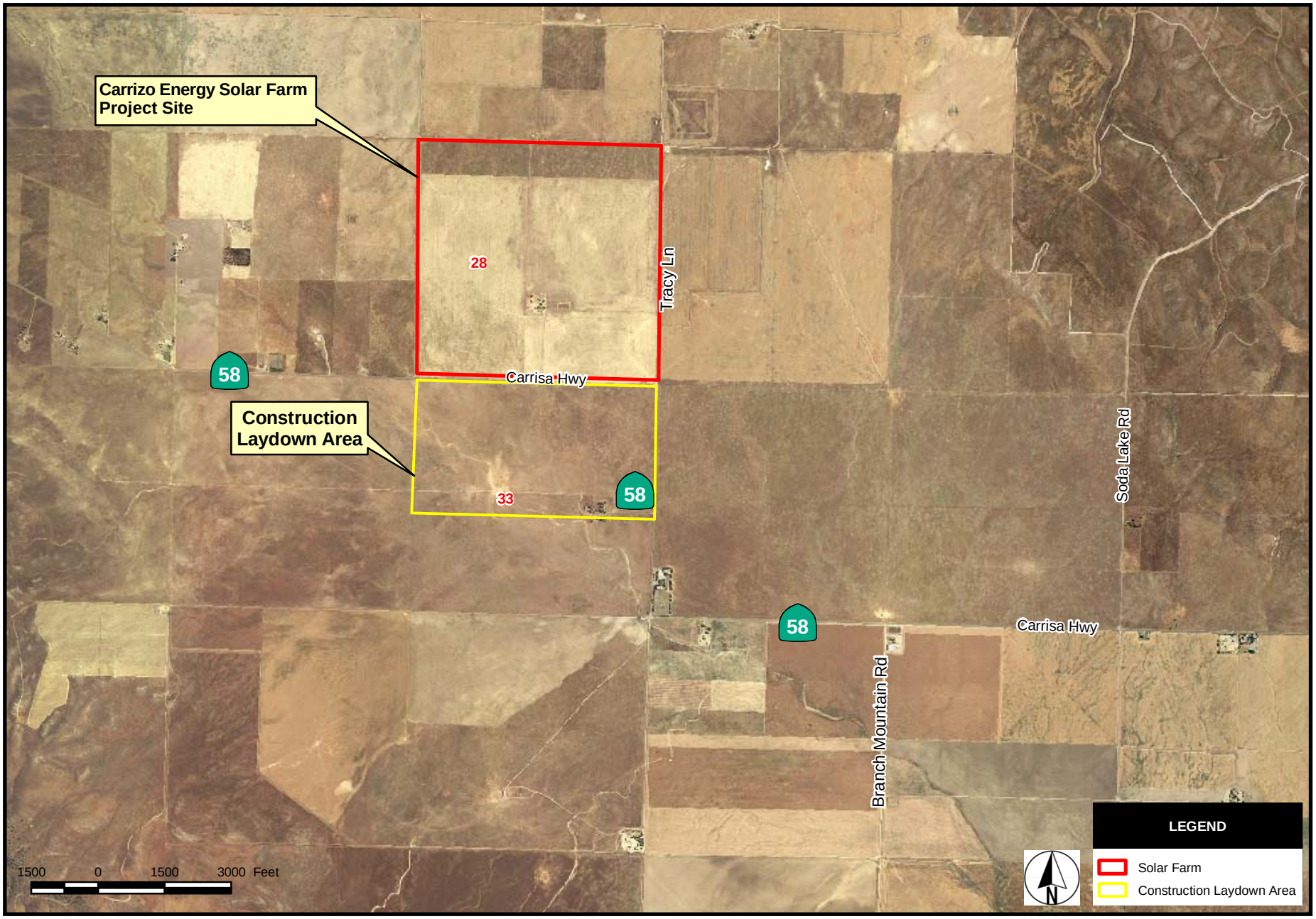
VISUAL RESOURCES - FIGURE 1

Carrizo Energy Solar Farm Project - Aerial View of Carrizo Energy Solar Farm Site and Vicinity



SOURCE: AFC Figure 1.1-2

VISUAL RESOURCES - FIGURE 2

Carrizo Energy Solar Farm Project - Aerial View of Project Site

SOURCE: Google Earth

VISUAL RESOURCES - FIGURE 3

Carrizo Energy Solar Farm Project - Existing View of Project Site

SOURCE: Staff Photos March 2008

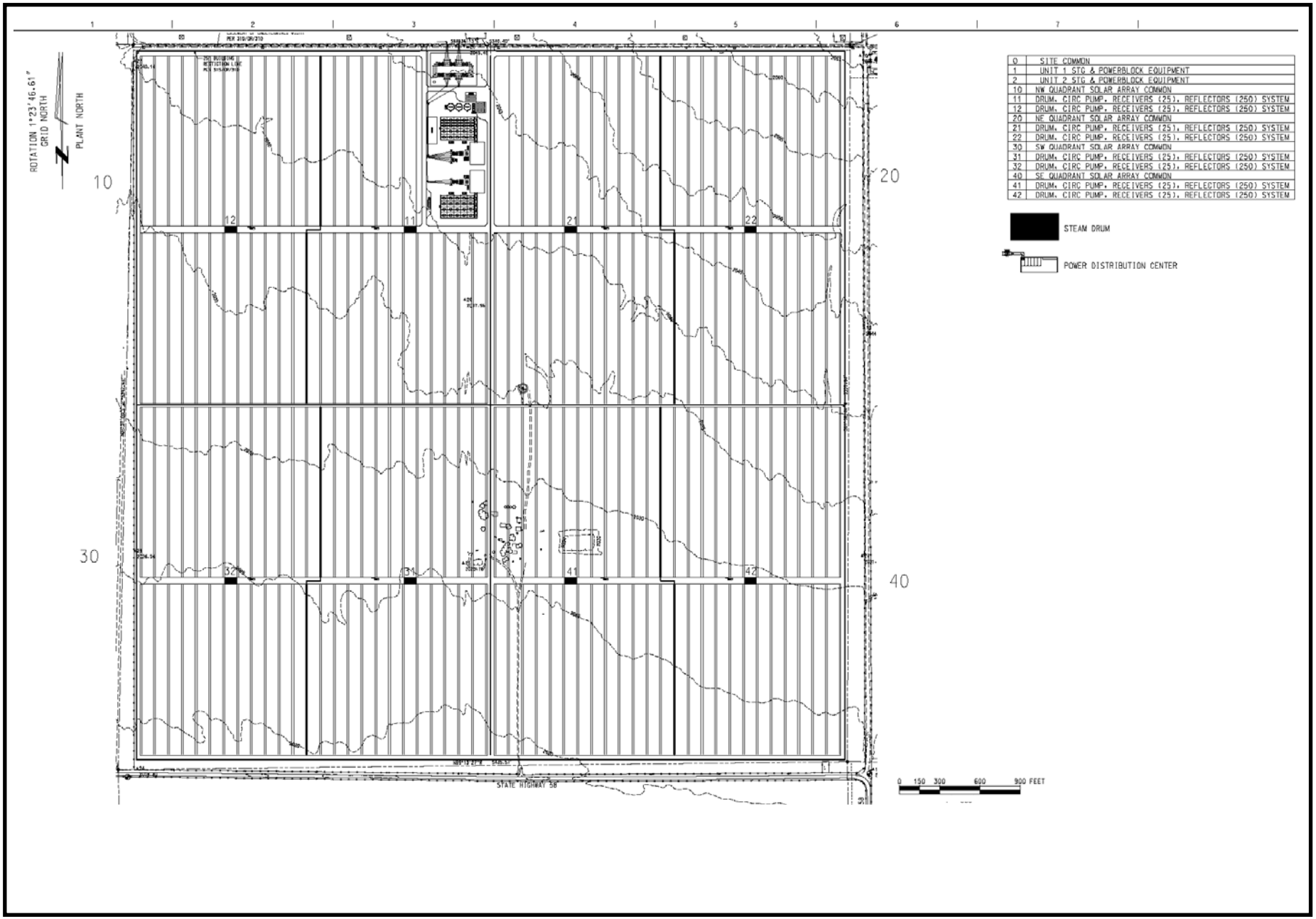
VISUAL RESOURCES - FIGURE 4

Carrizo Energy Solar Farm Project - Aerial Simulation of Carrizo Energy Solar Farm at Completion

SOURCE: 07-AFC- Supplement Figure 1.2-5

VISUAL RESOURCES - FIGURE 5

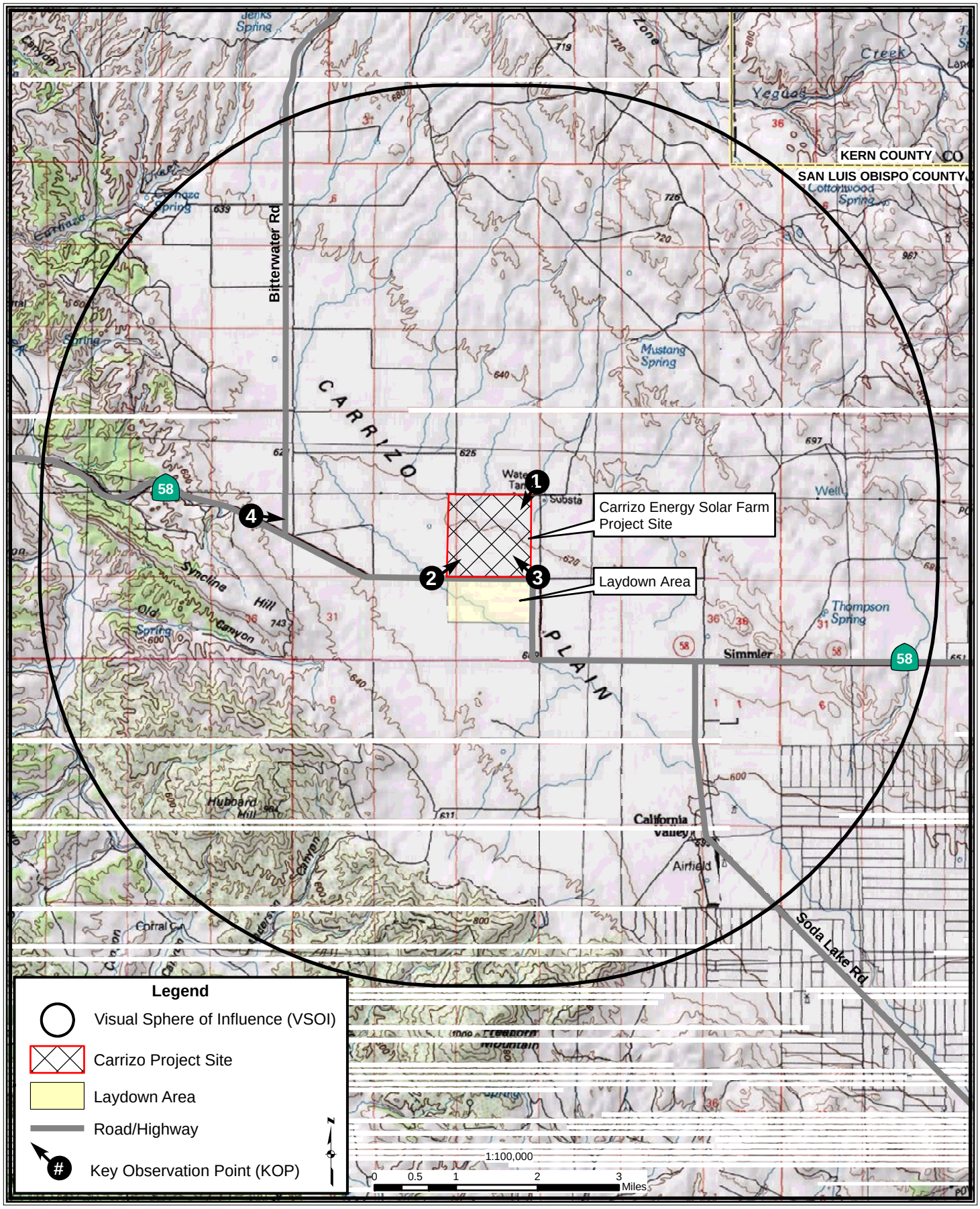
Carrizo Energy Solar Farm Project - Solar Field Layout Carrizo Energy Solar Farm



SOURCE: 07-AFC- Supplement Figure 1.2-1

VISUAL RESOURCES - FIGURE 6

Carrizo Energy Solar Farm - Visual Sphere of Influence

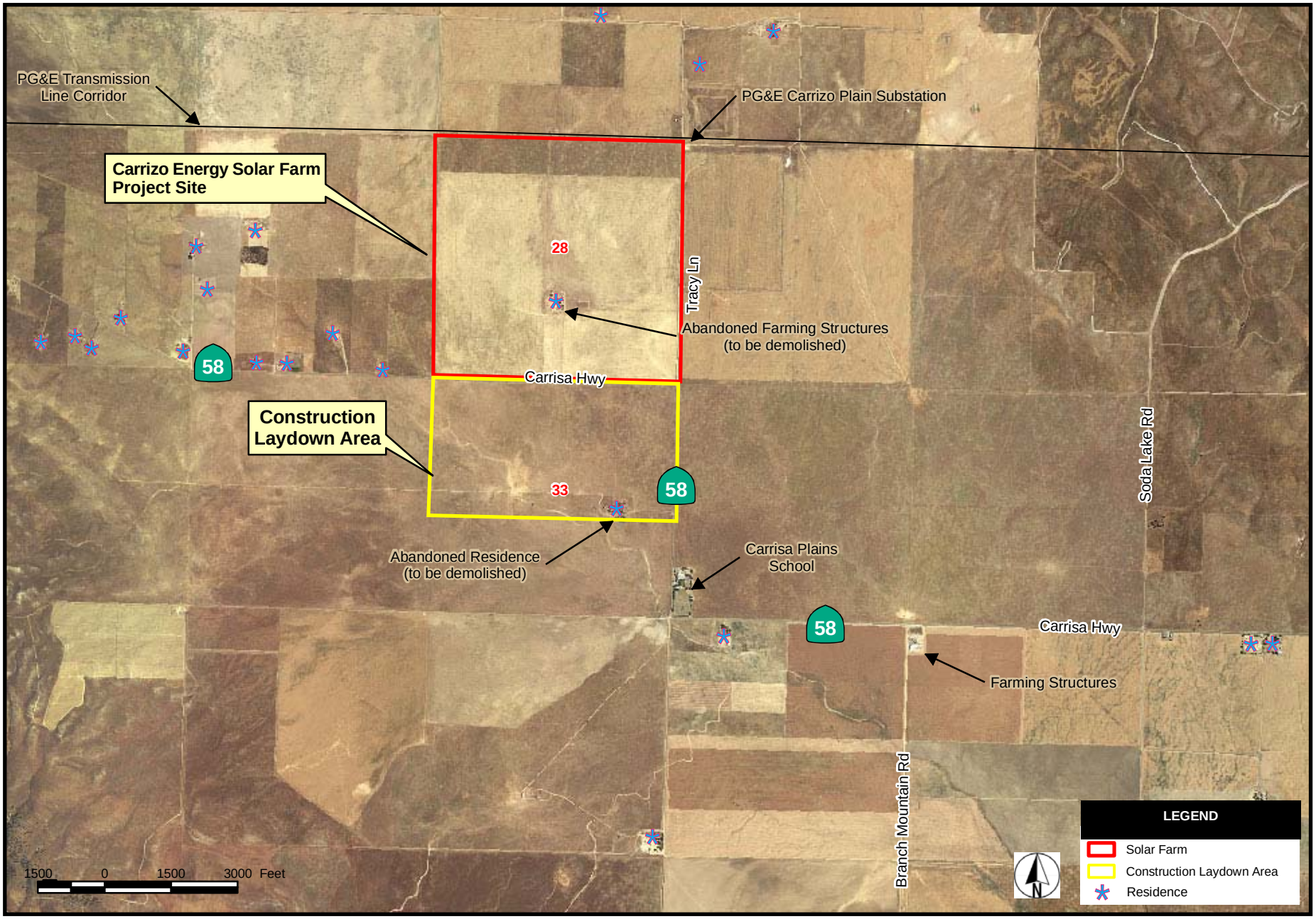


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: California Energy Commission- TOPO Map

VISUAL RESOURCES - FIGURE 7

Carrizo Energy Solar Farm Project - Location of Residences In Vicinity of Project Site



SOURCE: AFC Figure 5.13-2

VISUAL RESOURCES - FIGURE 8

Carrizo Energy Solar Farm Project - View of Existing Residences North of Project Site on Tracy Lane

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: CEC Staff Photos

VISUAL RESOURCES - FIGURE 9

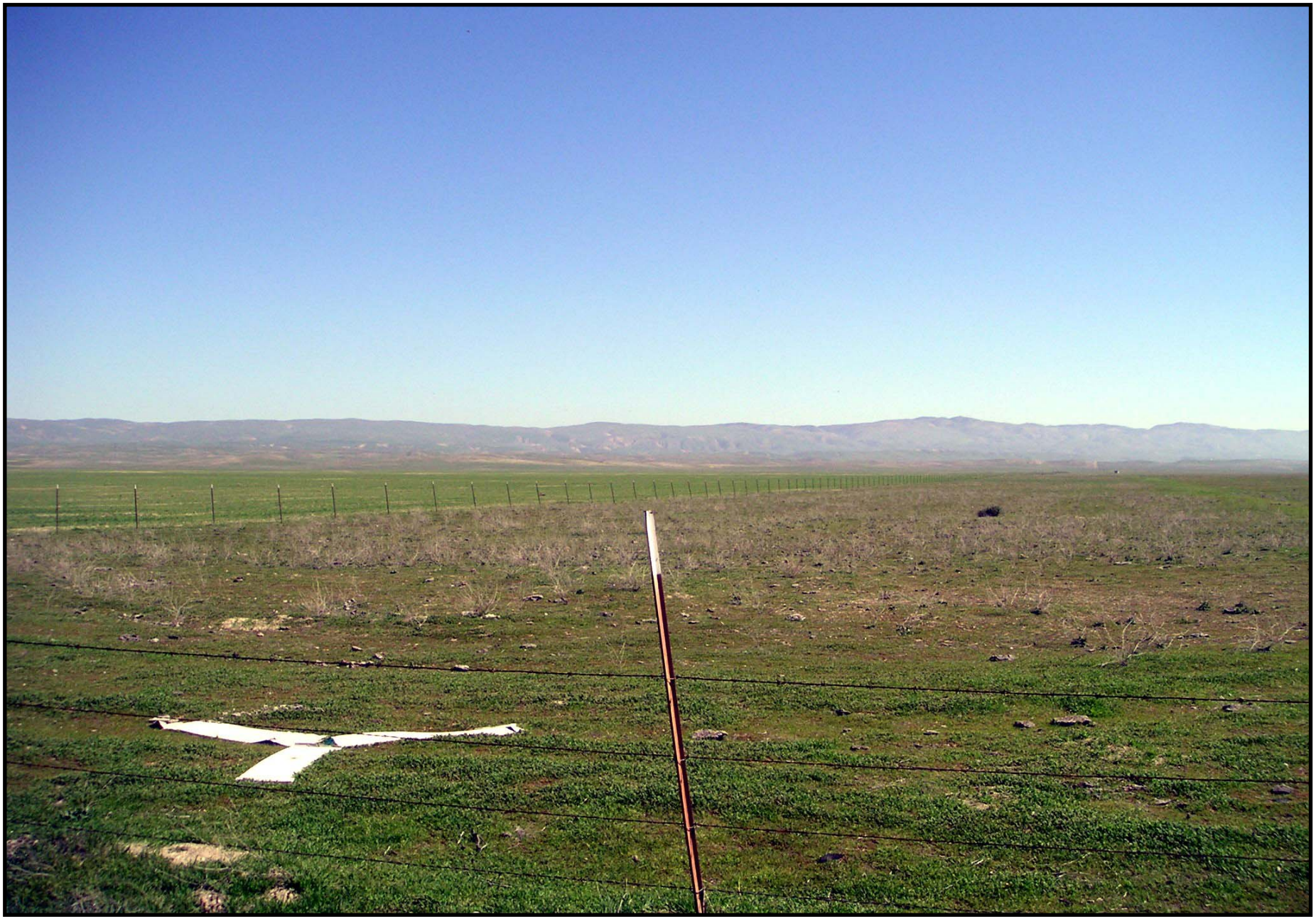
Carrizo Energy Solar Farm Project - View of Existing Residences West of Project Site Along State Route 58

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: CEC Staff Photos

VISUAL RESOURCES - FIGURE 10

Carrizo Energy Solar Farm Project - Existing View East of Project Site From Tracy Lane



SOURCE: CEC Staff Photos

VISUAL RESOURCES - FIGURE 11

Carrizo Energy Solar Farm Project - Existing View From Intersection of SR-58 and Tracy Lane

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: CEC Staff Photos

VISUAL RESOURCES - FIGURE 12

Carrizo Energy Solar Farm Project - KOP 1 - Existing View From Front Yard of Closest Residence North of Project Site Looking South

SOURCE: AFC Figure 5.13-12

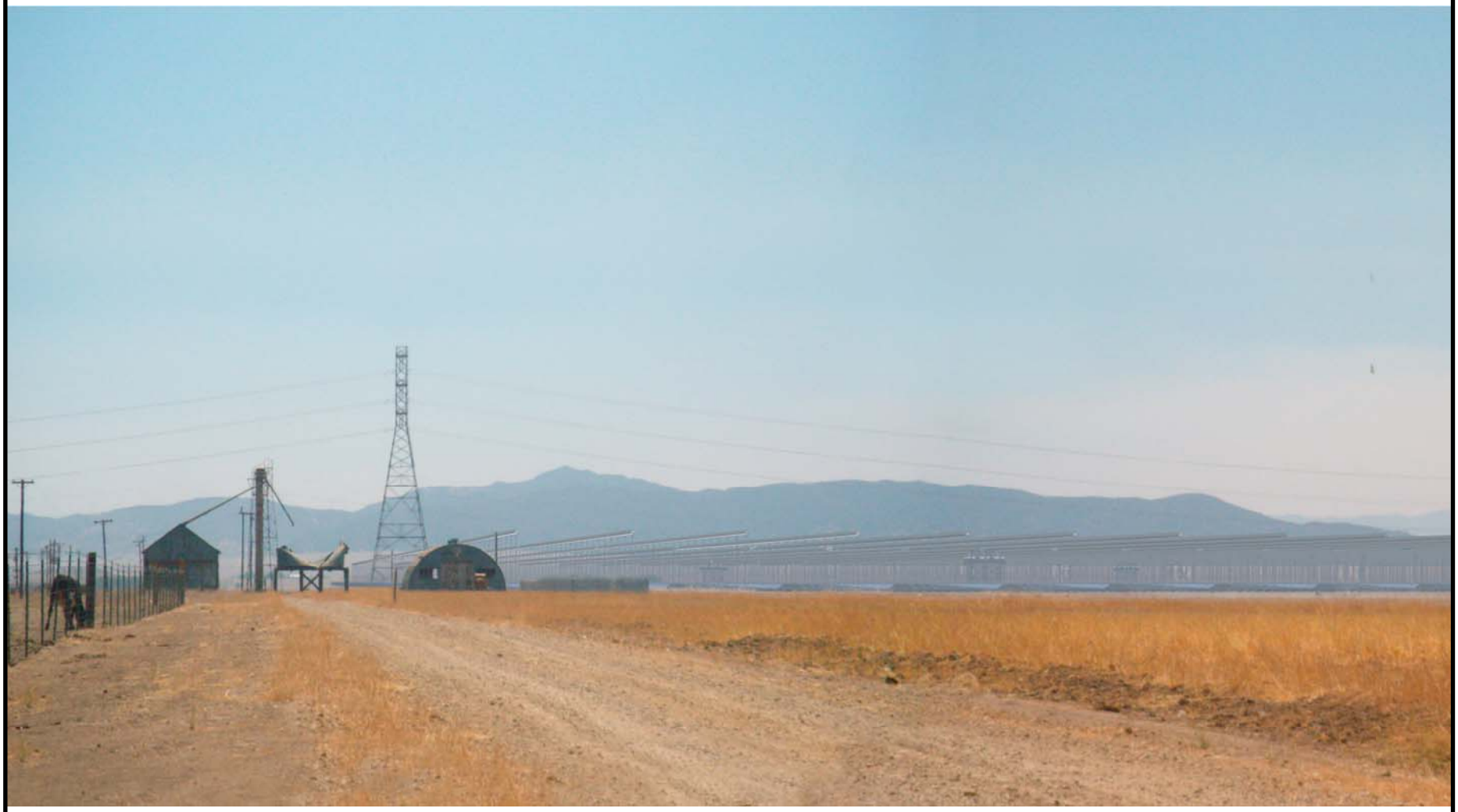
VISUAL RESOURCES - FIGURE 13

Carrizo Energy Solar Farm Project - Closest Residence North of Project Site along Tracy Lane and Panoramic of La Panza Range

SOURCE: CEC Staff Photo

VISUAL RESOURCES - FIGURE 14

Carrizo Energy Solar Farm Project - KOP 1 - Simulation of Project's Publicly Visible Structures



SOURCE: AFC Figure 2.13-2

VISUAL RESOURCES - FIGURE 15

Carrizo Energy Solar Farm Project - KOP 2 - Existing View From Front Yard of Closest Residence West of Project Site Looking East

SOURCE: AFC Figure 5.13-14

VISUAL RESOURCES - FIGURE 16

Carrizo Energy Solar Farm Project - Closest Residence West of State Route 58 and Panoramic of Temblor Range

SOURCE: CEC Staff Photo

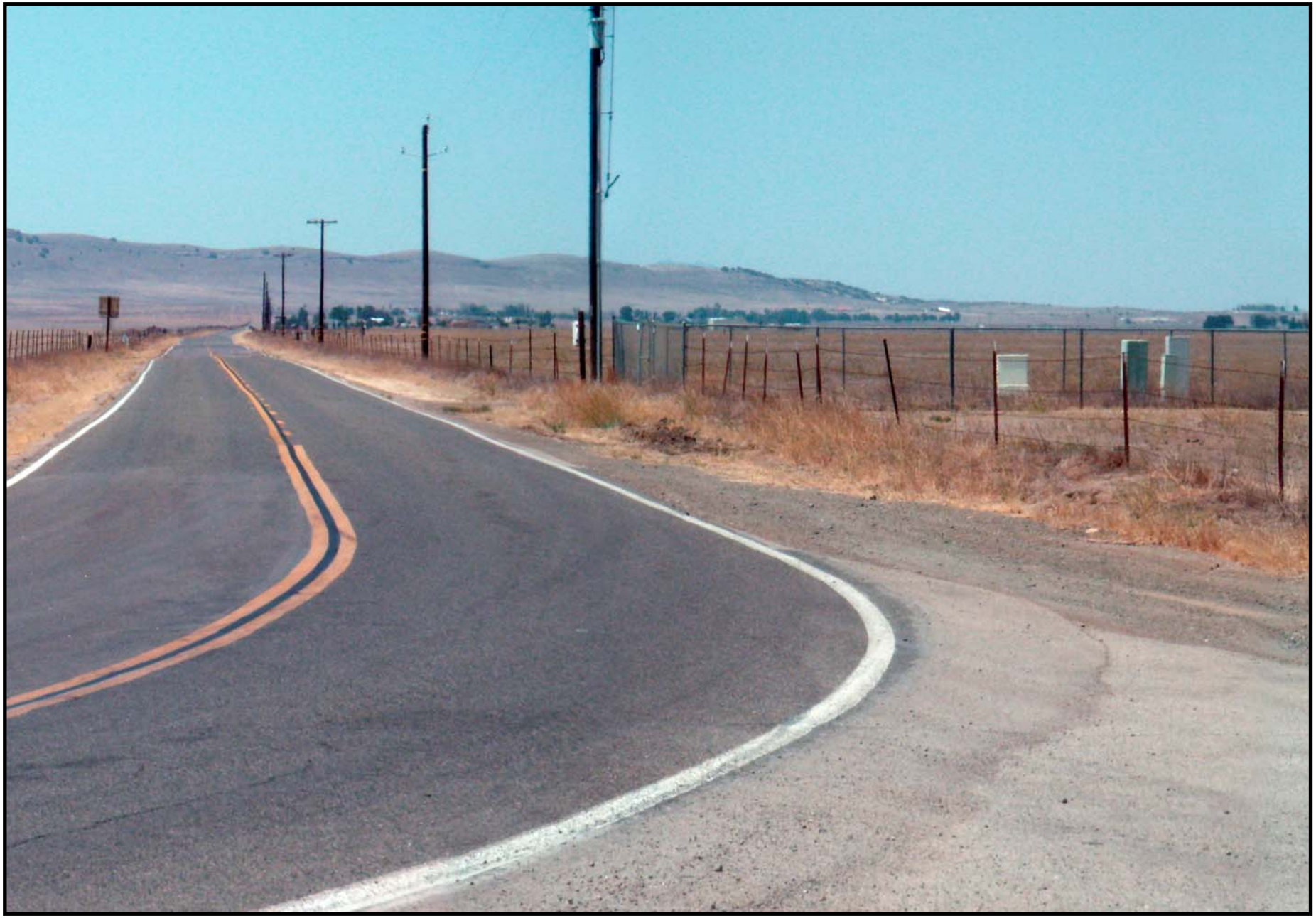
VISUAL RESOURCES - FIGURE 17

Carrizo Energy Solar Farm Project - KOP 2 - Simulation of Project's Publicly Visible Structures

SOURCE: 07-AFC-Supplement Figure 2.13-3

VISUAL RESOURCES - FIGURE 18

Carrizo Energy Solar Farm Project - Intersection of State Route 58 and Tracy Lane Looking West



SOURCE: AFC Figure 5.13-16

VISUAL RESOURCES - FIGURE 19

Carrizo Energy Solar Farm Project - KOP 3 - Simulation of Project's Publicity Visible Structures

SOURCE: AFC Figure 2.13-4

VISUAL RESOURCES - FIGURE 20

Carrizo Energy Solar Farm Project - Simulation of Project North of the Intersection of State Route 58 and Tracy Lane

SOURCE: AFC - Supplement Figure 2.13-5

VISUAL RESOURCES - FIGURE 21

Carrizo Energy Solar Farm Project - Simulation of Project Looking East Along State Route 58

SOURCE: AFC - Supplement Figure 2.13-7

VISUAL RESOURCES - FIGURE 22

Carrizo Energy Solar Farm Project - KOP 4 - Existing View Toward the Project Site Approximately 2 1/2 Miles West

SOURCE: AFC Figure 5.13-12

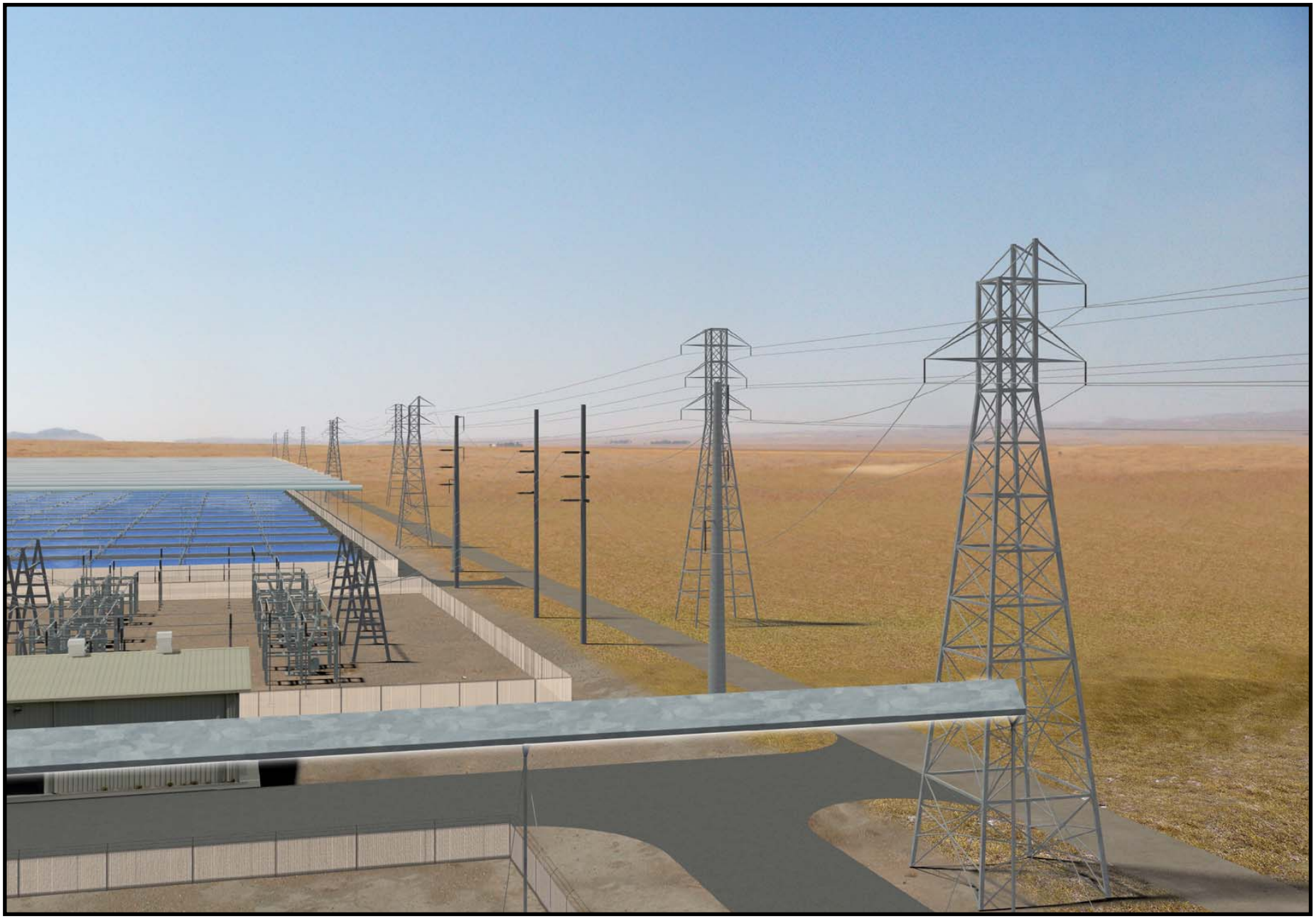
VISUAL RESOURCES - FIGURE 23

Carrizo Energy Solar Farm Project - KOP 4 - Simulation of Project's Publicly Visible Structures

SOURCE: 07-AFC-Supplement Figure 2.13-6

VISUAL RESOURCES - FIGURE 24

Carrizo Energy Solar Farm Project - Simulation of Project's Interconnection



SOURCE: AFC - Supplement Figure 1.6-3

VISUAL RESOURCES - FIGURE 25

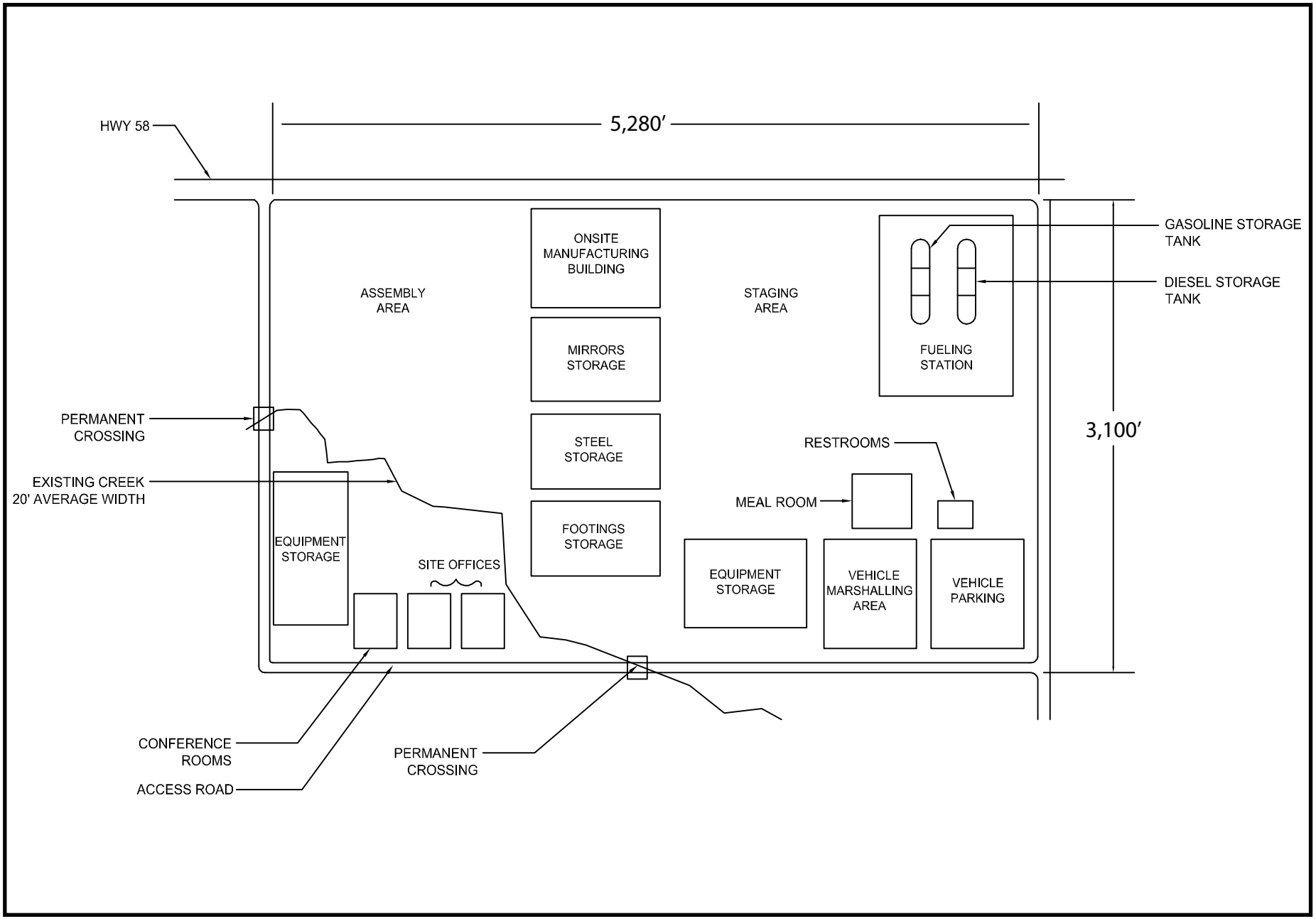
Carrizo Energy Solar Farm Project - Existing Views of the Proposed Construction Laydown Area

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: Staff Photos March 2008

VISUAL RESOURCES - FIGURE 26

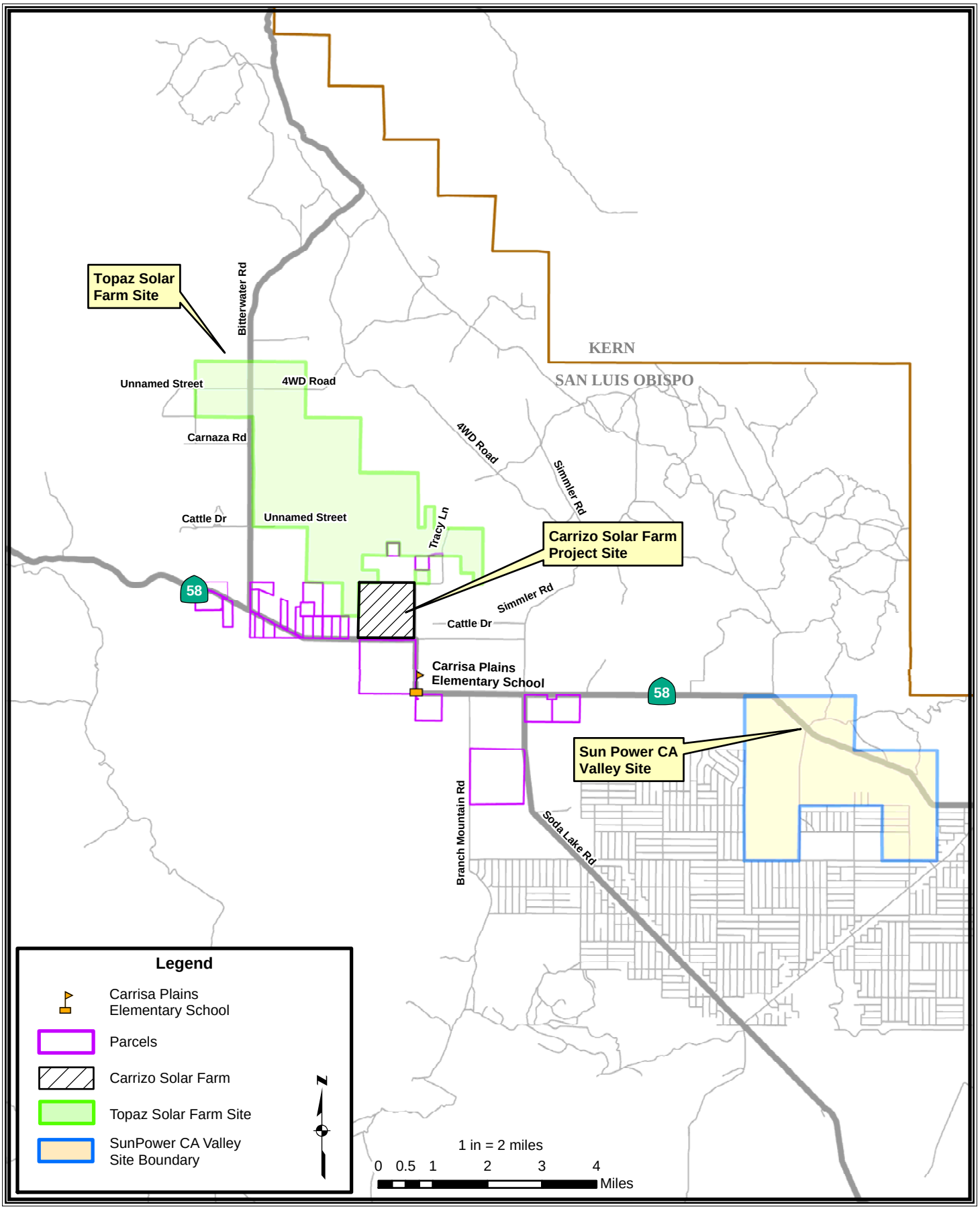
Carrizo Energy Solar Farm Project - Proposed Construction Laydown Area Site



SOURCE: 07-AFC- Supplement Figure 1.2-1

VISUAL RESOURCES - FIGURE 27

Location of Carrizo Energy Solar Farm, Topaz Solar Farm and California Valley Solar Ranch Project Sites

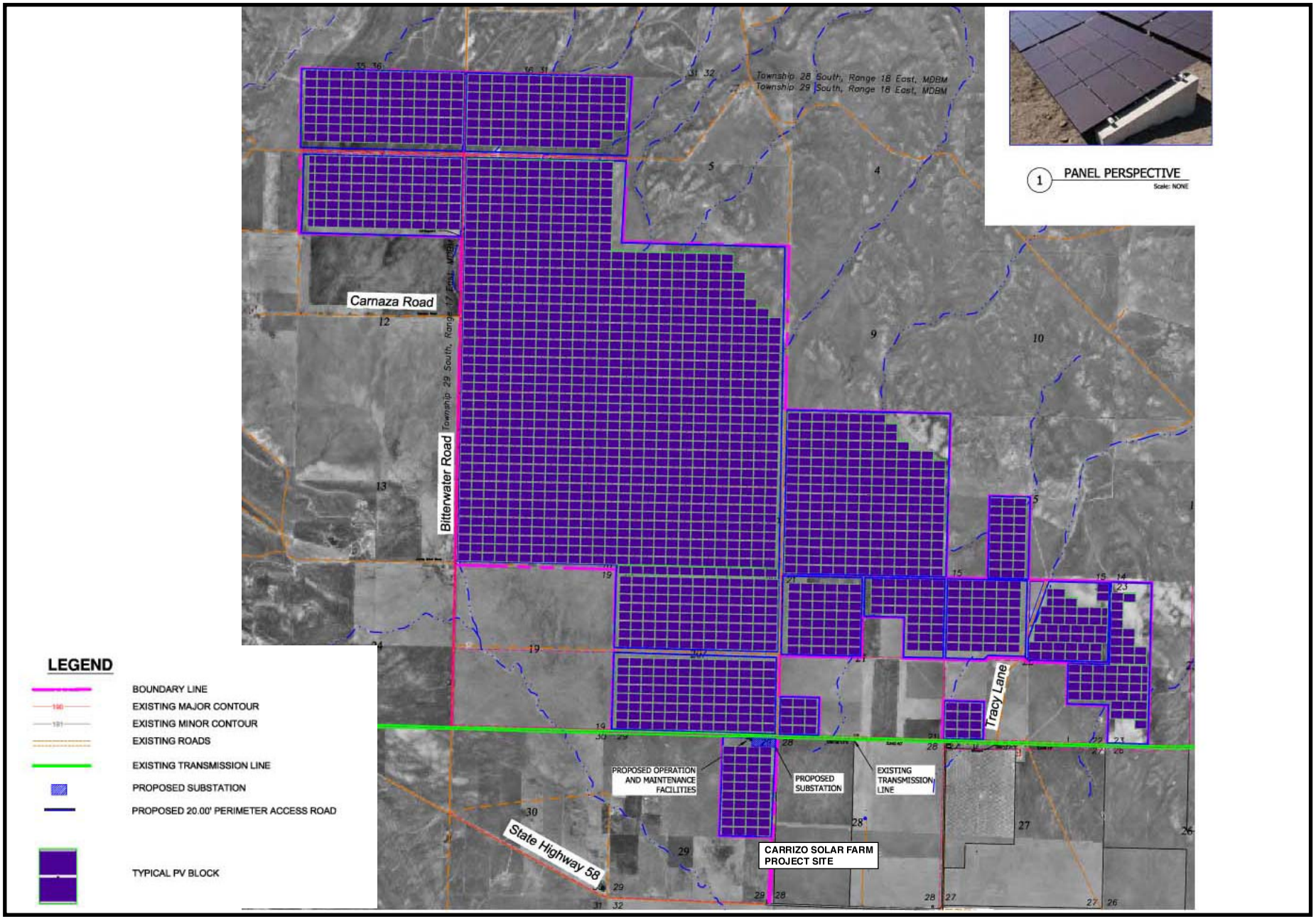


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008

SOURCE: AFC and Tele Atlas

VISUAL RESOURCES - FIGURE 28

Carrizo Energy Solar Farm Project - Topaz Solar Farm Conceptual Site Plan



SOURCE: San Luis Obispo County Planning and Building Department - Conditional Use Permit Application, Preliminary Site Plan Package - Sheet 4

Figure 29-A
Simulation of Topaz Solar Farm From State Route 58 Looking North Along The Carrizo Project Site West Boundary

Figure 29-B
Simulation of Topaz Solar Farm Project from Bitterwater Road

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008
SOURCE: San Luis Obispo County Planning and Building Department - Conditional Use Permit Application - Topaz Solar Farm

Figure 30-A
Elevation of Air Cooled Condenser Looking South

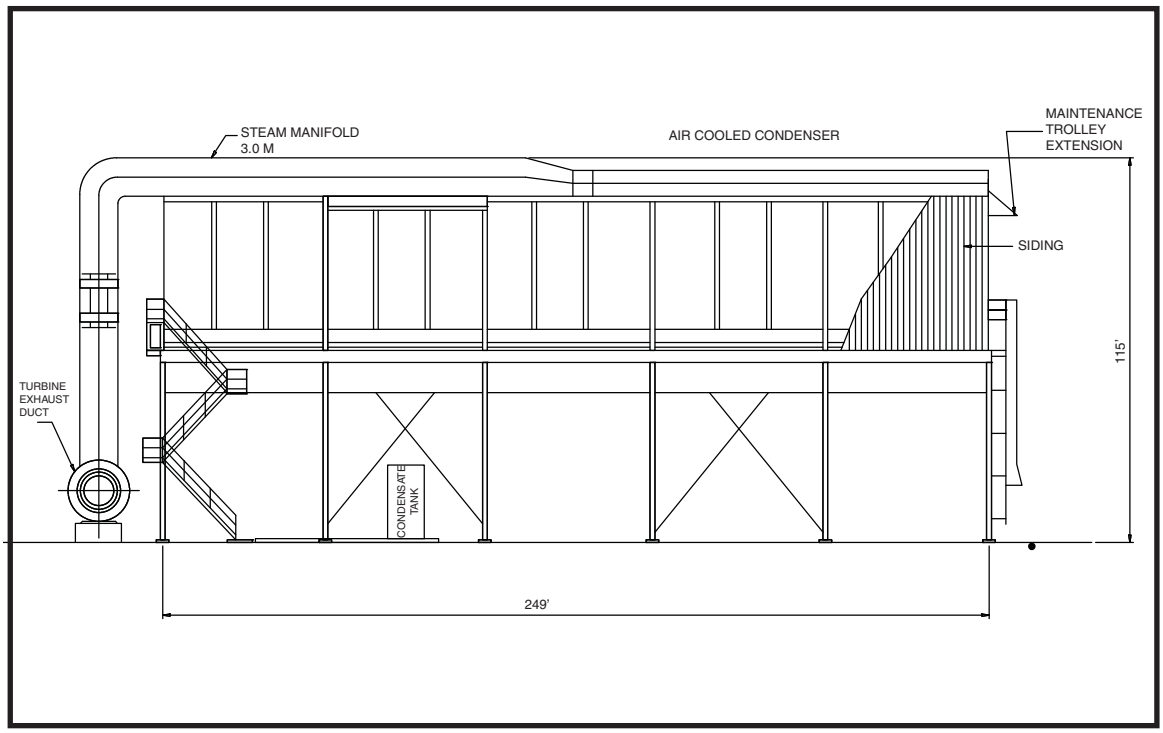
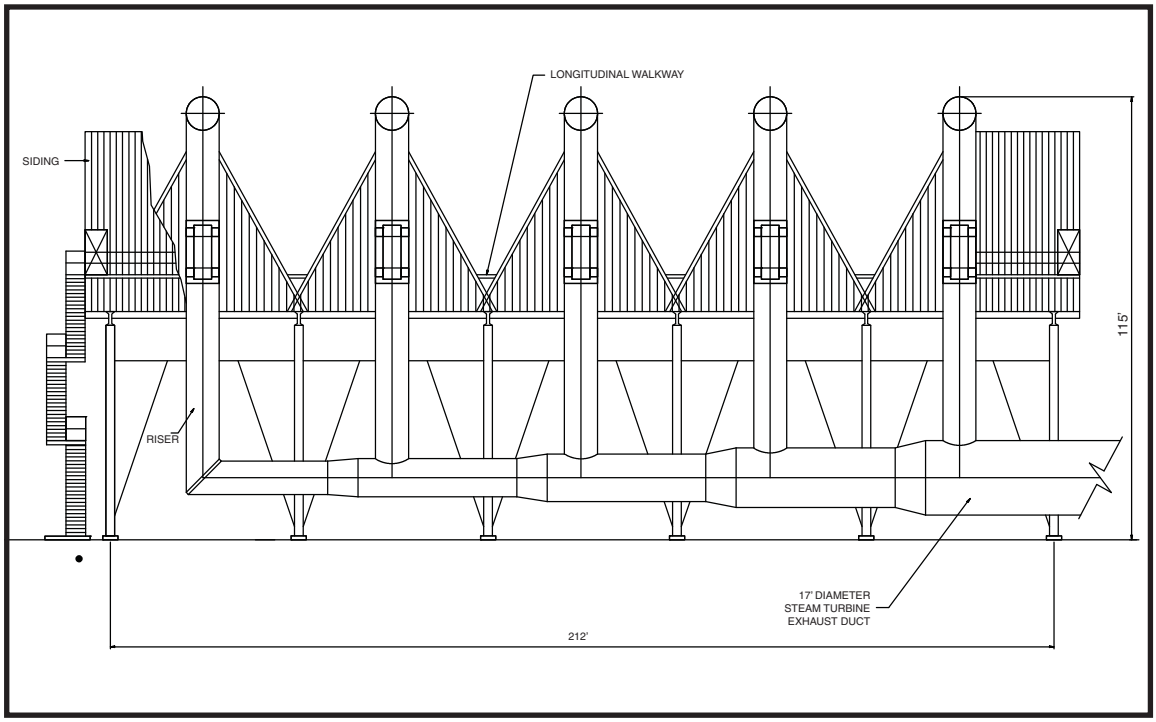


Figure 30-B
Elevation of Air Cooled Condenser Looking West



CALIFORNIA ENERGY COMMISSION - SITING,TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, NOVEMBER 2008
SOURCE: AFC Figures 3.4-5 & 3.4-6

WASTE MANAGEMENT

Suzanne Phinney, D.Env.

SUMMARY OF CONCLUSIONS

The Applicant's proposed construction and operation of the Carrizo Energy Solar Farm (CESF) would not likely result in significant environmental impacts provided the Applicant complies with staff's proposed conditions of certification.

INTRODUCTION

This Preliminary Staff Assessment (PSA) presents an analysis of issues associated with managing wastes generated from constructing and operating the proposed CESF project and any hazardous wastes already existing on site because of past activities. Staff has evaluated the proposed waste management plans and mitigation measures designed to reduce the risks and environmental impacts associated with handling, storing, and disposing of project-related hazardous and non-hazardous wastes. The technical scope of this analysis encompasses solid and liquid wastes existing on site, and those generated during facility construction and operation. Wastewater issues are more fully discussed in the **Soil and Water Resources** section of this document. Additional information related to waste management may also be covered in the **Worker Safety** and **Hazardous Materials Management** sections of this document.

Energy Commission staff's objectives in its waste management analysis are to ensure that:

- the management of 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; and
- during project operation, the site is managed such that contaminants would not pose a significant risk to humans or to the environment.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following framework of federal, state, and local environmental LORS exists to ensure the safe and proper management of hazardous wastes from generation to disposal in order to reduce the risks of accidents that might impact worker and public health and the environment.

WASTE MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
RCRA, Subtitle C	Establishes requirements for the management of solid wastes (including

and D, 42 USC § 6901 to 6992k, and Section 6.12.2.1	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 (USEPA) 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 USEPA and its ten regional offices. The Pacific Southwest regional office (Region 9) implements USEPA programs in California, Nevada, Arizona, and Hawaii.
40 CFR 260, *et seq.*	Contains regulations promulgated by the EPA to implement the requirements of RCRA as described above. Characteristics of hazardous waste are described in terms of ignitability, corrosivity, reactivity, and toxicity, and specific types of waste are listed.
Federal CWA, 33 USC § 1251 *et seq.*	Controls discharge of wastewater to the surface waters of the U.S.
State	
California Integrated Waste Management Act, Public Resources Code § 40000 *et seq.*	Provides an integrated statewide system of solid waste management by coordinating state and local efforts in source reduction, recycling, and land disposal safety. Counties are required to submit Integrated Waste Management Plans to the state.
Porter- Cologne Water Quality Control Act of 1998, Water Code § 13000 *et seq.*	Controls discharge of wastewater to surface waters and groundwaters of California.
22 CCR § 66262.34	Regulates accumulation periods for hazardous waste generators. Typically, hazardous waste cannot be stored onsite for more than 90 days.
California Health and Safety Code § 25100 *et seq.* (Hazardous Waste Control Act of 1972, as amended)	Creates the framework under which hazardous wastes must be managed in California. It mandates the State Department of Health Services (now the Department of Toxic Substances Control (DTSC), under the California Environmental Protection Agency (CalEPA), to develop and publish a list of hazardous and extremely hazardous wastes and to develop and adopt criteria and guidelines for the identification of such wastes. It also requires hazardous waste generators to file notification statements with

	Cal EPA and create a manifest system to be used when transporting such wastes.
Title 27, California Code of Regulations, §15100 et seq. (Unified Hazardous Waste and Hazardous Materials Management Regulatory Program)	Consolidates, coordinates, and makes consistent portions of the following six existing programs: • Hazardous Waste Generators and Hazardous Waste Onsite Treatment; • Underground Storage Tanks; • Hazardous Material Release Response Plans and Inventories; • California Accidental Release Prevention Program; • Aboveground Storage Tanks (spill control and countermeasure plan only); • Uniform Fire Code Hazardous Material Management Plans and Inventories; The statute requires all counties to apply to the CalEPA Secretary for the certification of a local unified program agency.
Title 14, California Code of Regulations, §17200 et seq. (Minimum Standards for Solid Waste Handling and Disposal)	Sets forth minimum standards for solid waste handling and disposal, guidelines to ensure conformance of solid waste facilities with county solid waste management plans and the California Integrated Waste Management Board, as well as enforcement and administration provisions.
Title 8 California Code of Regulations §1529 and §5208	Requires the proper removal of asbestos- containing materials and is enforced by California Occupational Safety and Health Administration (Cal OSHA).
Local	
San Luis Obispo County Environmental Health Services Division (EHSD)	Regulates enforcement responsibility for the implementation of Title 23, Division 3, Chapters 16 and 18 of the CCR, as it relates to hazardous material storage and petroleum Undergound Storage Tank cleanup.
San Luis Obispo CountyEHSD	Regulates hazardous waste generator permitting and hazardous waste handling and storage.
San Luis Obispo County General Plan Public Facilities Element	Ensures all new development complies with applicable provisions of County Integrated Solid Waste Management Plan.
San Luis Obispo County Air Pollution Control District	Implements the federal asbestos regulations specified in 40 CFR, Chapter 61, 145.

SETTING

The proposed 177 megawatt (MW) CESF would be located adjacent to California State Route 58 on a 640-acre site (Township 29 South, Range 18 East, Section 28) in an un-incorporated area of eastern San Luis Obispo County, California near the towns of Simmler and California Valley. A 380-acre construction laydown area (Section 33) would be located south and adjacent to the proposed site. The project would involve installing 195 solar concentrators and associated equipment and infrastructure

(CESF2007a, page 3-1). Additionally, during construction, reflector frames would be manufactured onsite in a new 40,000 square-foot building.

The site is in an area zoned for agriculture, and is primarily composed of disturbed ranchland. San Luis Obispo County permits electrical generation in agricultural zones. The currently unoccupied area has been used for dry-land farming and rural farmsteads since the 1920s. The former Carrizo Solar Power Company operated on adjacent land (Section 27) in the 1980s and 1990s (CESF2007a, Appendix Q).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

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.

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) at 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

[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.

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 the proposed project, Energy Commission 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.

Regarding the management of project-related wastes generated during construction and operation of the proposed project, staff reviewed the applicant's proposed solid and hazardous waste management methods and determined if the methods proposed are consistent with the LORS identified for waste disposal and recycling. The federal, state, and local LORS represent a comprehensive regulatory system designed to protect human health and the environment from impacts associated with management of both non-hazardous and hazardous wastes. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

Staff then reviewed the capacity available at off-site treatment and disposal sites and determined whether or not the proposed power plant's waste would have a significant impact on the volume of waste a facility is permitted to accept. Staff used a waste volume threshold equal to 10 percent of a disposal facility's remaining permitted capacity to determine if the impact from disposal of project wastes at a particular facility would be significant.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions

A Phase I ESA, dated August 23, 2007, was prepared by URS in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs. The Phase I ESA addressed structures and conditions on Township 29 South; Range 18 East; Sections 27, 28, and 33 and is included as Appendix Q of the project's AFC.

Structures located in Sections 28 and 33 include farmsteads and associated outbuildings constructed from the 1920s to 1940s. The structures are now in a state of disrepair, and several have collapsed. Based on the date of construction, potential exists for the presence of asbestos-containing materials (ACM) and lead-based paint (LBP). Nearby pole mounted transformers (as well as any interior fluorescent lighting fixtures) have the potential to contain polychlorinated biphenyls (PCBs). In addition, there were unmarked drums, mostly empty and unused. One full and two partially full

drums of unknown contents did not appear to be leaking. Above ground storage tanks for fuel storage or livestock and irrigation water collection were empty.

Structures previously located on Section 27 are associated with the former Carrizo Solar Power Corporation. The solar collection panels and operations building constructed from 1983-1984 were removed in 1997. An associated 2000-gallon diesel underground storage tank was installed in 1987. Soil sampling after the tank's removal in 1994 did not indicate contamination. Historical data, aerial photographs, and title records were consistent with the described structures and activities (CESF2007a, Appendix Q).

The Phase I ESA did not identify any Recognized Environmental Conditions (REC); however the interiors of privately-owned structures were not inspected and current landowners were not interviewed. The report recommended formal assessment of potential ACM, LBP, and hazardous materials contamination and qualified handling if confirmed (CESF2007a, Appendix Q).

Demolition and Construction Impacts and Mitigation

Demolition of existing structures, site preparation and construction of the proposed solar farm and its associated facilities would last approximately 35 months (CESF 2007a, page 3-31) 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 Demolition and Construction Waste Management Plan as described in the proposed Condition of Certification **Waste-1**. This plan must describe all waste streams and methods of managing each waste.

Non-Hazardous Wastes

Non-hazardous demolition materials would include concrete, wood, roofing, drywall, brick, glass, plastics, scrap metal, and other components from existing structures. (Any peeling or stratified lead based paint would be removed and considered under hazardous waste as described below). An estimated 3,160,000 pounds of demolition waste materials would require 140 truckloads to haul away. Of this amount, 70 to 90 percent may be recyclable (CESF 2008h, page 2.14-3). In accordance with San Luis Obispo County's construction debris demolition and recycling program, at least 50 percent of the project waste (by weight) must be recycled (SLO 2005).

Construction activities as described in the AFC would include site clearing and grading, installation of footings, and installation of the reflectors/ receivers (CESF 2007a, Table 2.14-1). Construction non-hazardous solid waste, totaling about 40 cubic yards, would consist of paper, wood, glass, plastics from packing material, waste lumber, insulation, scrap metal and concrete, and empty non-hazardous chemical containers (CESF 2007a, Table 5.14-2), . All non-hazardous wastes would be recycled to the greatest extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed of in a solid waste disposal facility (Class III landfill), per Title 14, California Code of Regulations, Section 17200 et seq. (*Minimum Standards for Solid Waste Handling and Disposal*), or in clean fill sites (CESF2007a, page 5.14-6),

Construction activities would also include assembly of reflector frames in a temporary building that would be constructed and then dismantled. The onsite, automated manufacturing of reflector frames would generate 100 kg per week of mirror glass to recycle or dispose of at a Class III landfill (CESF 2008n, page Waste-3). Construction and dismantling of the onsite manufacturing building would generate non-hazardous solid waste. The building would require approximately 40,000 square feet of floor space with a foundation comprised of 6-inch reinforced concrete flooring (CESF 2008h, page 1-3). Approximately 900 cubic yards of concrete would be required for the flooring. Additional materials would include rebar, structural steel building frames, building panels and robotic manufacturing components (CESF 200h, page 1-6). Of this material, 65,000 square feet of 6-inch slab is expected to be generated with 70-90 percent disposed at a recycling facility and the rest at a Class III landfill (CESF 2008n, page Waste-1).

Non-hazardous liquid wastes would be generated during construction, and would include stormwater runoff (13 gallons), sanitary waste (200 gallons per day), and equipment wash water. In addition, up to 237,755 gallons of raw water from raw water storage would be used for pipeline pressure testing and returned to the raw water tank (CESF2007a, page 5.14-6). Stormwater runoff would be managed in accordance with appropriate LORS. Please see the **Soil and Water Resources** section of this document for more information on the management of project wastewater.

Hazardous Wastes

Certain building material wastes are banned from disposal in California Class III landfills. Treated wood; paint and coatings; plumbing and pipes; fluorescent lamps; and batteries, thermostats, switches, and other electrical devices may contain asbestos, arsenic, lead, mercury, and PCBs may be contained in. Asbestos is also found in various types of older building material including cement, roofing, flooring, insulating or fire-proofing materials. Fluorescent lights, batteries, thermostats, electrical switches and solvent-based and lead-based paints are wastes banned from California trash.

Demolition of the onsite buildings and equipment could result in 12,920 pounds of hazardous materials (CESF 2008h, Table 2.14-1). For planning purposes, the Applicant has included the presence of ACMs and LBP. The Applicant has stated that it would prepare and implement a Demolition Hazardous Building Materials Management Plan if ACMs and LBP are confirmed to exist during demolition activities. The plan would include an ACM Abatement and Management Plan and an LBP Abatement and Management Plan (CESF 2008h, page 2.14-4).

Condition of Certification **Waste-1** would incorporate these two plans and ensure the appropriate removal and disposal of hazardous materials. Condition of Certification **Waste-2** would require an asbestos survey and notification of the San Luis Obispo County Air Pollution Control District (SLOAPCD). In addition, **Waste-2** requires that the project owner submit the SLOAPCD's Asbestos Notification Form for review and approval prior to removal and disposal of asbestos (SLOAPCD 2008). All friable asbestos (Class I) collected during demolition activities must be disposed of as hazardous waste. During construction, anticipated hazardous wastes include waste paint, spent construction solvents, waste cleaners, waste oil, oily rags, waste batteries,

and spent welding materials. Approximately 2.1 cubic yards (440 gallons) of hazardous waste, plus 40 batteries, would be generated from construction of the project. 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 (CESF 2007a, pages 5.14-5 to 5.14-6).

Additionally, the onsite manufacturing may generate hazardous wastes, including waste adhesive (30 liters per day), waste adhesive prep (2 liters per day), and empty adhesive drums (5 drums per day day). These wastes would be disposed of at a hazardous waste facility. Waste filters containing copper (160 micrograms per day), manganese (5 micrograms per day), and zinc oxide (1,024 micrgrams per day) would be recycled (CESF 2008n, page Waste-3). The bag house filters would have a self cleaning cycle, and the wastes would be deposited into non-permeable bag-lined bins (CESF 2008h, page 2.14-2) and recycled (CESF 2008n, page Waste-1). In addition, an emergency generator would produce small amounts of lubricating oils (CESF 2008h, page 2.14-2). Construction and dismantling of the onsite manufacturing building would not likely generate hazardous wastes.

Conditions of Certification **Waste-3** and **Waste-4** would require that the appropriate professionals oversee activities that may disturb hazardous materials or contaminated soil, determine if further sampling and analysis is required, and comply with agency requirements.

The construction contractor is considered to be the generator of hazardous wastes at this site during construction. 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-5** to notify the Compliance Project Manager (CPM) whenever the owner becomes aware of this action.

Operation Impacts and Mitigation

The proposed CESF would generate both non-hazardous and hazardous wastes in solid and liquid forms under normal operating conditions. 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-6**.

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. Wastes would be recycled to the greatest extent possible and non-recyclable

wastes would be removed on a regular basis for disposal in a Class III landfill (CESF 2007a, pages 5.14-7 to 5.14-8). The project would generate approximately 10 cubic yards of non-hazardous solid waste per week; approximately half of that amount would be recyclable office waste (CESF 2008a, page Waste-1).

Non-hazardous Liquid Wastes

Non-hazardous liquid wastes generated during the project's operation are further discussed in the **Soil and Water Resources** section of this document. Non-hazardous process wastewater would be recovered and recycled back to the water treatment system. Stormwater drainage would be drained away from the site to collection ponds and swales, from which the water would percolate or evaporate. Stormwater from the active area (potentially contaminated by oil and thus hazardous) is discussed directly below under hazardous wastes. Sanitary wastes (from toilets, sinks, and showers) would be handled by a 1,000 gallon septic tank and buried leach field (CESF 2007a, page 5.14-8).

Hazardous Wastes

The project owner is the generator of hazardous wastes at this site during operations; therefore a unique hazardous waste generator identification number would be required for the generation of hazardous waste, pursuant to the proposed Condition of Certification **Waste-7**. Hazardous wastes anticipated to be generated during routine project operation include used hydraulic fluid, oil and grease, oily filters, spent batteries, oily absorbent and waste oil/sludge. Any stormwater containing hazardous oil would be routed to the oil water separator. Table 5.14-3 of the AFC provides a list of wastes, the amounts expected to be generated, and their disposal methods (CESF 2007a, page 5.14-7).

Recycling methods would be used to the extent possible. The remaining hazardous waste would be temporarily stored on site, pursuant to the California Fire Code and Title 22, California Code of Regulations, Section 66262.10 et seq., and disposed of by licensed hazardous waste collection and disposal companies in accordance with all applicable regulations, pursuant to Title 22, California Code of Regulations, Section 66262.10 et seq. Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency for violation of requirements imposed by federal law, the project owner would be required by the proposed Condition of Certification **Waste-5** to notify the CPM whenever the owner becomes aware of this action. The Energy Commission retains enforcement authority for local and state requirements.

Impact on Existing Waste Disposal Facilities

Non-hazardous Solid Wastes

Non-hazardous waste disposal sites suitable for discarding project-related construction and operation wastes are identified in Table 5.14-1 of the AFC (CESF 2007a) and presented below as Waste Management Table 2:

WASTE MANAGEMENT Table 2
Non-Hazardous Waste Disposal Sites

	Title 23 Class	Permitted Capacity	Operating Capacity	Remaining Capacity	Estimated Closure Date	Enforcement Action Taken?
Solid Recycling/Waste Disposal Site						
Cold Canyon Landfill	Class III	10.9 million cubic yards per year	1,200 tons per day	2.8 million cubic yards	2012	Notice and Order for enforcement action for explosive gas control in Years 2005, 2006
Chicago Grade Landfill	Class III	2.7 million cubic yards per year	500 tons per day	2.3 million cubic yards	2042	No
City of Paso Robles Landfill	Class III	6.5 million cubic yards per year	250 tons per day	4 million cubic yards	2034	No
Thermal Remediation Solutions (Solids Recycling) 1211 West Gladstone Ave. Azusa, CA 91702	Class III	200,000 tons per year	2,000 tons per day	Not applicable	Not applicable	No
American Remedial Technologies (Solids Recycling) 2680 Seminole Ave. Lynwood, CA 90262	Class III	200,000 tons per year	19,900 tons per month	Not applicable	Not applicable	One notice of violation pertaining to odor in Year 2000
TPS Technologies, Inc. (Soil Recycling) 12328 Hibiscus Ave. Adelanto, CA 92301	Not applicable	Not applicable	350,000 tons per year	Not applicable	Not applicable	No
Chemical Waste Management Kettleman Hills Landfill (Solids Disposal) 36251 Old Skyline Rd. Kettleman City, CA 93239	Class I	10.7 million cubic yards per year	200,000 cubic yards per year	6-7 million cubic yards	2037 – 2038	No
Safety Kleen Buttonwillow Landfill (Solids Disposal) Lokern Road Kern County, CA	Class I	13.25 million cubic yards per year	150,000 cubic yards per year	10.9 million cubic yards	2068 – 2078	No
TPS Technologies, Inc. (Soil Recycling) 12328 Hibiscus Ave. Adelanto, CA 92301	Not Applicable	Not applicable	350,000 tons per year	Not applicable	Not applicable	No outstanding previous violations
Liquid Recycling/Waste Disposal Site						

	Title 23 Class	Permitted Capacity	Operating Capacity	Remaining Capacity	Estimated Closure Date	Enforcement Action Taken?
DeMenno/Kerdoon (Liquids Recycling) 2000 N. Alameda St. Compton, CA 90222	Not applicable	84.1 million gallons per year of oily water and 123 million gallons per year of waste oil	Approximately 30 million gallons per year	Not applicable	Not applicable	No outstanding previous violations

Non-hazardous solid waste would be disposed at the Cold Canyon, Chicago Grade or city of Paso Robles Landfills, all located in San Luis Obispo County. As shownin the table, all three landfills have significant remaining capacity and their estimated closure dates are 2012, 2042, and 2034, respectively.
The total amount of non-hazardous waste generated from project construction and operation is expected to contribute less than 1 percent of available landfill capacity. Disposal of the solid wastes generated by the CESF would not significantly impact the capacity or remaining life of any of these facilities.

Hazardous Wastes

Section 5.14.1.4 of the AFC discusses two of California's Class I landfills: Clean Harbor's Buttonwillow landfill in Kern County and Waste Management's Kettleman Hills landfill in Kings County (CESF 2007a, page 5.14-2). The Kettleman Hills facility accepts Class II and III waste. In total, there is a combined excess of 16 million cubic yards of remaining hazardous waste disposal capacity at these landfills, with at least 30 years remaining in their operating lifetimes. In addition, the Kettleman Hills facility is in the process of permitting an additional 15 million cubic yards of disposal capacity (EEC2006a, Section 8.14.3.5.2), and the Buttonwillow facility has 40 years to reach its capacity at its current disposal rate (CEC2008aa).

All hazardous wastes generated during both construction and operation would be transported off site to a permitted treatment, storage, or disposal (TSD) facility for appropriate disposition, preferably through recycling. The volume of hazardous waste from the CESF requiring off-site disposal would be far less than staff's threshold of significance, which is 10 percent of the existing combined capacity of the two Class I landfills, and would therefore not significantly impact either the capacity or remaining life of these facilities.

CUMULATIVE IMPACTS

The 41 permitted projects within a 5-mile radius of the project site since 2000 are all of a small residential scale. Staff believes that based on typical volumes of waste from residential development, cumulative impacts from non-hazardous and hazardous waste would be insignificant In the larger vicinity, OptiSolar has filed an application for a 6,200-acre, 550 MW photovoltaic (PV) facility to the immediate north and west. Additionally, Sun Power plans to build a 250 MW solar PV facility to the east of the CESF. OptiSolar's Topaz Solar Farm and Sun Power's California Valley Solar Ranch would likely use the same landfills as CESF. While waste projections from the two PV projects have yet to be published, solar PV plants generally do not produce large quantities of waste. In addition, recycling efforts would be prioritized wherever practical in

conformance with Title 14, California Code of Regulations. Due to the minor amounts of wastes generated during project construction and operation, the insignificant impacts on individual disposal facilities and the availability of additional regional landfills, cumulative impacts would likely be insignificant for both hazardous and nonhazardous waste disposal.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the CESF would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The project owner is required to recycle and/or dispose hazardous and non-hazardous waste at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be produced during project operation, the CESF would be required to obtain a hazardous waste generator identification number from U.S. EPA. The CESF would also be required to properly store, package, and label 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.

Staff has determined that management of the waste generated during construction and operation or those associated with demolition of existing structures would comply with waste management laws, ordinances, regulations, and standards.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has received comments relating to waste management from Carrizo Plain resident, John Ruskovich. He expressed concerns about the occurrence and quantity of hazardous material (RUSK2008a).

Any hazardous wastes, which are significantly less than the amount generated by traditional power plants, would be properly managed, either through recycling or disposal (CESF2008c, page 5).

CONCLUSIONS

In accordance with the three main objectives for staff's waste management analysis (as presented in the Introduction section), staff provides the following conclusions:

1) As discussed in the Impact on Existing Waste Disposal Facilities section, the total amount of hazardous and non-hazardous waste generated from project construction and operation is expected to contribute less than 1 percent of available landfill capacity.

2) The applicant's proposed waste management procedures appear to provide for proper management of project wastes and would be in compliance with all applicable waste management LORS. Staff notes that both construction and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent

feasible, and non-recyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits, and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

To help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **7**. These conditions would require the project owner to do all of the following:

- the project owner shall prepare and submit a demolition and construction waste management plan for all wastes generated during demolition and construction of the facility and submit the plan to the CPM for approval **(WASTE-1)**;
- the project owner shall, before demoilition of any buildings, conduct a hazardous materials survey, and if found, shall properly dispose and provide SLOAPCD completed forms which show the results of asbestos and lead-based paint surveys and their proper disposal **(WASTE-2)**;
- the project owner shall have an experienced and qualified Professional Engineer or Professional Geologist available for consultation during project site construction, excavation, and grading activities, in the event that contaminated soils are encountered **(WASTE-3)**;
- if potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities, the Professional Engineer or Professional Geologist shall inspect the site, determine the need for sampling, file a written report, and seek guidance from both the CPM and the appropriate regulatory agencies **(WASTE-4)**;
- the project owner shall notify the CPM whenever the owner becomes aware of any impending waste management-related enforcement action **(WASTE-5)**;
- the project owner shall prepare and submit an operation waste management plan for all wastes generated during operation of the facility and submit the plan to the CPM for approval **(WASTE-6)**;
- and the project owner shall obtain a hazardous waste generator identification number from the DTSC in accordance with DTSC regulatory authority **(WASTE-7)**.

3) Existing conditions at the CESF site include structures with the potential to contain asbestos-containing materials, lead-based paint, and polychlorinated biphenyls. To ensure that the project site is investigated as necessary and to reduce any impacts from prior or future hazardous substance or hazardous waste releases at the site to a level of insignificance, staff proposes Conditions of Certification **WASTE-1**, **2**, **4**, and **6**. These conditions would require the project owner to ensure that the project site has been investigated and remediated; demonstrate that project wastes are managed properly; and ensure that any contamination encountered during construction, as well as future spills or releases of hazardous substances or wastes are properly reported, cleaned-up, and remediated as necessary. Therefore, staff

concludes that construction and operation of the proposed CESF would not result in contamination or releases of hazardous substances that would pose a substantial risk to human health or the environment.

Staff has determined that proper management, as described herein, of the wastes generated during construction and operation or those associated with demolition of existing structures would not result in any significant adverse environmental impacts.

PROPOSED CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall prepare a Demolition and Construction Waste Management Plan for all wastes generated during demolition of existing structures and construction of the facility, and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a description of all construction waste streams, including projections of frequency, amounts generated and hazard classifications;
- a survey of structures to be demolished that identifies the types of waste to be managed; 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/reduction plans.

Verification: No fewer than 30 days before the start of site mobilization, the project owner shall submit the Demolition and Construction Waste Management Plan to the CPM for approval.

WASTE-2 Before demolition of any buildings, the project owner shall conduct a hazardous materials survey to determine if lead-based paint and/or asbestos-containing material are present. The project owner shall pay SLOAPCD's removal fee and remove any asbestos containing materials. Any other regulated building materials such as lead-based-paints, will follow the proper removal and disposal practices defined in 40 CFR 61.145.

Verification: At least 60 days before the start of site mobilization, the project applicant shall provide survey, fees and forms to the SLOAPCD and to the CPM for review and comment.

WASTE-3 The project owner shall provide the resume of an experienced and qualified Professional Engineer or Professional Geologist, who shall be available for consultation during building removal, and soil excavation and grading activities, to the CPM for review and approval. The resume shall demonstrate experience in remedial investigation and feasibility studies.

The registered professional engineer or geologist shall be given full authority by the project owner to oversee any earth-moving activities that could disturb contaminated soil.

Verification: At least 30 days before the start of site mobilization, the project owner shall submit the resume to the CPM for review and approval.

WASTE-4 If potentially contaminated soil is unearthed during building removal or excavation at either the proposed site or at 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 file a written report to the project owner and to 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 further 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 Hazardous Materials Division of San Luis Obispo County's Environmental Health Department for guidance and possible oversight.

Verification: The project owner shall submit any final reports filed by the Professional Engineer or Professional Geologist to the CPM within five days of their receipt. The project owner shall notify the CPM within 24 hours of any orders issued to halt construction.

WASTE-5 Upon learning of any impending waste management-related enforcement action by any local, state, or federal authority for violation of requirements imposed by federal law, the project owner shall notify the CPM of any action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify the CPM, in writing within 10 days of learning of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required to the manner in which project-related wastes are managed.

WASTE-6 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility (including construction, operation and dismantling of the onsite manufacturing building) 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 ensure 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 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-7 The project owner shall obtain a hazardous waste generator identification number from the Department of Toxic Substances Control prior to generating any hazardous waste during operations.

Verification: The project owner shall keep its copy of the identification number on file at the project site and notify the CPM of its receipt in the relevant monthly compliance report.

REFERENCES

CEC2008aa – CEC/E. Kiyan Aspen (tn: 48993) Record of Conversation – Staff and John McKenzie of SLO County Planning Department. Dated 12/10/2007. Submitted to CEC/Docket Unit on 4/28/2008.

CEC2008ab – CEC/E. Kiyan Aspen (tn: 48992) Record of Conversation – Staff and Mariana Buoni of Clean Harbor's Buttonwillow Landfill. Dated 1/25/2008. Submitted to CEC Docket Unit on 4/28/2008.

CESF2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/ M Dyas/Dockets on 10/25/2007.

CESF2008a – Carrizo, LLC/A. Lieba URS (tn: 45465) Responses to Data Requests 1-78. Dated 2/26/2008. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 2/27/2008.

CESF2008c – Carrizo, LLC/A. Lieba URS (tn: 45672) Response to John Ruskovich's Public Comments/Questions. Dated 3/18/2008. Submitted to CEC/B.B. Blevins/ M Dyas/Dockets on 3/18/2008.

CESF2008h – Carrizo, LLC/A. Lieba URS (tn: 46925) AFC Supplement. Dated 7/3/2008. Submitted to CEC/Melissa Jones/Dockets on 7/3/2008.

CESF2008n—Carrizo, LLC/A. Lieba URS (tn: 48221) Responses to Data Requests 113–134, dated 9/26/2008, submitted to CEC/Melissa Jones/Dockets on 9/26/2008

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

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San Luis Obispo County (SLO) 2005. "Construction and Demolition Debris Recycling Program." <http://www.slocounty.ca.gov/Assets/PW/Franchise/ManagingProjectWaste.pdf>.

San Luis Obispo County Air Pollution Control District (SLOAPCD) 2008. "Asbestos Demolition/Renovation Notification Form- General Information." <http://www.slocleanair.org/business/forms/OtherForms/asbestosinstructions.pdf>.

WORKER SAFETY AND FIRE PROTECTION

Geoff Lesh, P.E. and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff concludes that if the applicant for the proposed Carrizo Energy Solar Farm (CESF) project provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY -1, -2, -3, -4, -5,** and **-6**, the project would incorporate sufficient measures to both ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards (LORS). These proposed conditions of certification ensure that these programs, proposed by the applicant, will be reviewed by the appropriate agencies before they are implemented. The conditions also require verification that the proposed plans adequately ensure worker safety and fire protection and comply with applicable LORS.

Staff also concludes that the proposed project would not have significant impacts on local fire protection services. The proposed facility would be located near an industrial area that is currently served by the local fire department. The fire risks at the proposed facility do not pose significant added demands on local fire protection services. Staff also concludes that the California Department of Forestry and Fire Protection/San Luis Obispo County Fire Department (CDF/SLOCFD) are adequately equipped and staffed to respond to hazardous materials incidents at the proposed facility with an adequate response time, given the remote location of this project (Swan2008).

INTRODUCTION

Worker safety and fire protection are regulated through federal, state, and local LORS. Industrial workers at the facility both operate equipment and handle hazardous materials daily, and could face hazards resulting in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or minimize their risk through special training, protective equipment, and procedural controls.

The purpose of this preliminary staff assessment (PSA) is to assess the worker safety and fire protection measures proposed by the CESF applicant and determine whether the applicant has proposed adequate measures to:

- Comply with applicable safety LORS;
- Protect workers during the construction and operation of the facility;
- Protect against fire; and
- Provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

WORKER SAFETY AND FIRE PROTECTION Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
29 U.S. Code sections 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).
29 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 §1910.1 to 1910.1500.
State	
8 CCR all applicable sections (Cal/OSHA regulations)	Requires that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during the construction, commissioning, and operation of power plants, as well as safety around electrical components, fire safety, and hazardous materials usage, storage, and handling.
24 CCR section 3, et seq.	Incorporates the current edition of the International Building Code.
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) requires the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) to deal with any potential release of hazardous materials and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Health and Safety Code sections 25500 to 25541	Requires a Hazardous Materials Business plan detailing emergency response plans for hazardous materials emergencies at a facility.
Local (or locally enforced)	
San Luis Obispo County Department of Environmental Health Services	Requires new/modified businesses to complete a Hazardous Materials Business Plan and Chemical Inventory Forms prior to final plan/permit approval. Regulates enforcement responsibility for the implementation of Title

	23, Division 3, Chapter 16 and 18 of CCR, as it relates to hazardous material storage and petroleum underground storage tanks (UST) cleanup.
2007 Edition of California Fire Code and all applicable NFPA standards (24 CCR Part 9)	National Fire Protection Association (NFPA) standards are incorporated into the California Fire Code. The fire code contains general provisions for fire safety, including road and building access, water supplies, fire protection and life safety systems, fire-resistive construction, storage of combustible materials, exits and emergency escapes, and fire alarm systems.
Title 24, California Code of Regulations (24 CCR § 3, et seq.)	The California Building Code is comprised of 11 parts containing building design and construction requirements as they relate to fire, life, and structural safety. It incorporates current editions of the International Building Code, including the electrical, mechanical, energy, and fire codes applicable to the project.

SETTING

Fire support services to the site will be under the jurisdiction of the California Department of Forestry and Fire Protection/San Luis Obispo County Fire Department (CDF/SLOCFD). The CESF onsite fire suppression systems will be backed up by fire suppression support from the CDF/SLOCFD. Both fire and emergency service will be provided from the California Valley (aka Simmler) Fire Station 42, located at 13080 Soda Lake Road, California Valley, California, 93453, with an estimated response time of 10 minutes (CESFa section 5.17.2.2.5.2 and Swan2008). Backup emergency response, if ever needed, would come from La Panza Fire Station 41, located at 5398 Pozo Road, Santa Margarita, CA 93453 with an estimated response time of 30 to 40 minutes (Swan2008).

CDF/SLOCFD would be the first responder for hazardous materials incidents. Staff finds that the available local hazmat teams are capable of responding to a hazardous materials emergency call from CESF with an adequate response time.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Two issues are assessed in **Worker Safety and Fire Protection**:

1. The potential for impacts on the safety of workers during demolition, construction, and operation activities; and

2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, and operations.

Worker safety is essentially a LORS compliance matter and if all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on worker health is whether the applicant has demonstrated adequate knowledge of and commitment to implementation of all pertinent and relevant Cal-OSHA standards.

Staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant, as well as the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the CESF site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews and evaluates local fire department capabilities and response times, and interviews local fire officials to determine if they feel adequately trained, staffed, 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 additional resources to the fire department.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Worker Safety

Industrial environments are potentially dangerous during both construction and operation. Workers at the proposed project will be exposed to loud noises, moving equipment, trenches, and confined space entry and egress. Workers may sustain falls, trips, burns, lacerations, and other injuries. They may be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks or electrocution. It is important that CESF has well-defined policies and procedures, training, and hazard recognition and control to minimize these 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 will be prepared by the applicant to minimize worker hazards during construction and operation of the project. “Safety and health program,” for staff, refers to measures that will be taken to ensure compliance with the applicable LORS during the construction and operation of the project.

Construction Safety and Health Program

CESF includes the construction and operation of a solar thermal power plant with steam generating equipment. Workers will be exposed to construction hazards typical of construction of the steam-handling portions of a gas-fired facility since the solar component offers similar construction risks and minimal operational risks.

Construction safety orders are published at Title 8 of the California Code of Regulations, sections 1502, et seq. These requirements are promulgated by Cal/OSHA and apply to the construction phase of the project. The construction safety and health program will include the following:

- Construction injury and illness prevention program (8 CCR § 1509);
- Construction fire prevention plan (8 CCR § 1920);
- Personal protective equipment program (8 CCR §§ 1514 - 1522); and
- Emergency action program and plan.

Additional programs under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will 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;
- Hazardous waste program;
- Hot work safety program;
- Permit-required confined space entry program; and
- Demolition procedure (if applicable).

The AFC includes adequate outlines for each of the above programs (CESFa, section 5.17.2.1). Prior to the project's start of construction, detailed programs and plans will be provided pursuant to Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start-up of CESF, an operations and maintenance safety and health program will be prepared. This program will include the following programs and plans:

- Injury and illness prevention program (8 CCR § 3203);
- Fire prevention program (8 CCR § 3221);
- Personal protective equipment program (8 CCR §§ 3401 to 3411); and
- Emergency action plan (8 CCR § 3220).

In addition, the requirements under General Industry Safety Orders (8 CCR §§ 3200 to 6184), Electrical Safety Orders (8 CCR §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (8 CCR §§ 450 to 544) will apply to this project. Written safety programs for CESF, which the applicant will develop, will ensure compliance with those requirements.

The AFC includes adequate outlines for an injury and illness prevention program, an emergency action plan, a fire prevention program, and a personal protective equipment program (CESFa, section 5.17.2.2). Prior to operation of CESF, all detailed programs and plans will be provided 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. The major items required in both Safety and Health Programs are as follows:

Injury and Illness Prevention Program (IIPP)

The IIPP will include the following components (CESFa, section 5.17.2.2):

- Identify persons with the authority and responsibility for implementing the program;
- Establish the safety and health policy of the plan;
- Define work rules and safe work practices for construction activities;
- Establish a system for ensuring that employees comply with safe and healthy work practices;
- Establish a system to facilitate employer-employee communication;
- Develop procedures for identifying and evaluating workplace hazards and establish necessary program(s);
- Establish methods for correcting unhealthy/unsafe conditions in a timely manner;
- Determine and establish training and instruction requirements and programs;
- Specify safety procedures; and
- Provide training and instruction.

Fire Prevention Plan

The California Code of Regulations requires an operations fire prevention plan (8 CCR § 3221). The AFC outlines a proposed fire prevention plan that is acceptable to staff (CESFa, sections 5.17.2.1.4 and 5.17.2.2.5). The plan will include the following:

- Determine general program requirements;
- Determine fire hazard inventory, including ignition sources and mitigation;
- Develop good housekeeping practices and proper materials storage;

- Establish employee alarms and/or communication system(s);
- Provide portable fire extinguishers at appropriate site locations;
- Locate fixed fire fighting equipment in suitable areas;
- Specify fire control requirements and procedures;
- Establish proper flammable and combustible liquid storage facilities;
- Identify the location and use of flammable and combustible liquids;
- Provide proper dispensing and determine disposal requirements for flammable liquids;
- Establish and determine training and instruction requirements and programs; and
- Identify contacts for information on plan contents.

Staff proposes that the applicant submit a final fire prevention plan to the California Energy Commission compliance project manager (CPM) for review and approval and to the CDF/SLOCFD for review and comment to satisfy proposed conditions of certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require personal protective equipment (PPE) and first aid supplies whenever hazards in the environment, or from chemicals or mechanical irritants, could cause injury or impair bodily function through absorption, inhalation, or physical contact (8 CCR sections 3380 to 3400). The CESF operational environment will require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and will carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information about protective clothing and equipment:

- Proper use, maintenance, and storage;
- When protective clothing and equipment are used;
- Benefits and limitations; and
- When and how protective clothing and equipment are replaced.

The PPE program ensures that employers comply with applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential hazards in the workplace, and will be required as per proposed Conditions of Certification **WORKER SAFETY-1 and -2**.

Emergency Action Plan

California regulations require an emergency action plan (8 CCR § 3220). The AFC contains a satisfactory outline for an Emergency Action Plan (CESFa section 5.17.2.2.5).

The outline lists the following features:

- Establishes emergency procedures for the protection of personnel, equipment, the environment, and materials;
- Identifies fire and emergency reporting procedures;
- Determines response actions for accidents involving personnel and/or property;
- Develops response and reporting requirements for bomb threats;
- Specifies site assembly and emergency evacuation route procedures;
- Defines natural disaster responses (for example, earthquakes, high winds, and flooding);
- Establishes reporting and notification procedures for emergencies (including on-site, off-site, local authorities, and/or state jurisdictions);
- Determines alarm and communication systems needed for specific operations;
- Includes a spill response, prevention, and countermeasure (SPCC) plan;
- Identifies emergency personnel (response team) responsibilities and notification roster;
- Specifies emergency response equipment and strategic locations; and
- Establishes and determines training and instruction requirements and programs.

An emergency action plan will be required as per proposed Conditions of Certification **WORKER SAFETY-1** and **-2**

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 operations safety programs will address safe work practices in 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 staff assessment.

In addition, the project owner will be required to provide personnel protective equipment and exposure monitoring for workers involved in activities where contaminated soil and/or contaminated groundwater exist, per staff’s proposed Conditions of Certification **WORKER SAFETY-1** and**-2**.

These proposed conditions of certification ensure that workers are properly protected from any hazardous wastes presently at the site.

Safety Training Programs

Employees will 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 generating station located in the high desert. The solar generating station features approximately 1950 solar reflectors that heat water flowing through piping to approximately 518°F. Experience at existing solar generating stations shows that reflectors break, the pipes age, and water leaks develop. 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 arrays for water leaks and broken reflectors daily by driving up and down dirt paths between the rows of reflectors. 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 exceed 100 °F and sometimes reach 115 °F.

The applicant has indicated that workers will be adequately trained and protected, but has not included precautions against exposure to herbicides. Therefore, to ensure that workers are indeed protected, staff has proposed additional requirements found in Conditions of Certification **WORKER SAFETY-6**. This requirement consists of the following provision: the development and implementation of Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar arrays.

Staff believes that effective implementation of a BMP for herbicide storage and application will mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides will contaminate either surface water or groundwater. Staff recommends that a BMP follow either the guidelines established by the U.S. EPA (EPA 1993), or more recent guidelines established by the State of California or U.S. EPA.

Additional Mitigation Measures

Protecting construction workers from injury and disease is one of the greatest challenges today in occupational safety and health. The following facts are reported by 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 1980-1993, an average of 1,079 construction workers were killed on the job each year, with more fatal injuries than any other industry;
- Falls caused 3,859 construction worker fatalities, or 25.6 percent of the total, between 1980 and 1993;
- 15 percent of workers' compensation costs are spent on construction injuries;

- Ensuring safety and health in construction is a complex task involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity to one another;
- In 1990, Congress directed NIOSH to conduct research and training to reduce diseases and injury 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 well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex industrial projects like 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 workers. This has been evident in the audits of power plants recently conducted by the staff. 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 to improve their safety and health performance; to assist them in striving to eliminate the four major construction hazards (falls, electrical, caught in/between, and struck-by hazards) that 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 subcontractors that have exemplary safety and health programs.

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” appears in many OSHA and Cal-OSHA standards, documents, and directives. A “Competent Person” is 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 project site construction safety supervisor.

As discussed above, the hazards associated with the construction industry are well documented and increase in complexity in the multi-employer worksites typical of large industrial projects such as power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past because of both the failure to recognize and control safety hazards and the inability to adequately monitor 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 include, but are not limited to, safety oversights such 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 the commissioning team, and then to operations;
- Dangerous placement of hydraulic elevated platforms under one another;
- Inappropriate placement of fire extinguishers near hotwork;
- Dangerous placement of numerous power cords in standing water on the site, 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 that address the proper procedures to follow in the event of the discovery of suspicious packages or objects either onsite or offsite.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to require 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 the operations staff. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner but reporting to the Chief Building Official (CBO) and the 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 audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged them 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 provides a fresh perspective" of the site.

SPECIAL CASE OF VALLEY FEVER RISK IN THE PROJECT AREA

Construction and operation of the proposed project would pose a risk of valley fever to workers, operators, and the general public who could inhale the airborne spores of the fungus (of the *Coccidioides* species), which is the causative agent of valley fever. It is the growth of these inhaled spores in the lungs that constitutes valley fever whose symptoms could be mild with influenza-like symptoms and rashes, or life-threatening from pneumonia, lung nodules, and meningitis. The risk of serious symptoms is highest for individuals with weakened immune systems such as pregnant women, and those with several types of pre-existing diseases.

Since the fungal stores at issue are disseminated while attached to the dust, it is not possible to prevent all risks of infection in the project area and other parts of the southern United States where the fungus occurs naturally. This infection risk is

minimized through measures that minimize soil disturbance and dust generation. The **Air Quality** staff seeks to minimize this risk through the recommended Conditions of Certification **AQ-SC3** and **AQ-SC4**, which would minimize dust generation in the construction phase. In additional **AQ-SC7** limits vehicle speeds during the operational phase to minimize dust and infection risk in the area. Staff considers the recommended **Air Quality** conditions of certification as adequate to minimize this valley fever risk as possible in the project and other areas where the *Coccidioides* fungus occurs naturally. Additional protection for workers at the project will be provided by adherence to the elements of the aforementioned Personal Protective Equipment Program required in the Safety and Health Programs as required in Conditions of Certification **WORKER SAFETY-1** and **-2**.

Fire Hazards

During construction and operation of the proposed CESF 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 project power plant switchyard or flammable liquids, explosions, and overheated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely at power plants. Fires and explosions of flammable gasses or liquids are rare. Compliance with all LORS will be adequate to ensure protection from all fire hazards.

Staff reviewed the information provided in the AFC and spoke to representatives of the CDF/SLOCFD to determine if available fire protection services and equipment would adequately protect workers, and to further determine the project's impact on fire protection services in the area. The project will rely on both onsite fire protection systems and local fire protection services. The onsite 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 CDF/SLOCFD (CESFa 5.17.2.2.5.2 and Swan2008).

Construction

During construction, portable fire extinguishers will be located and maintained throughout the site; safety procedures and training will also be implemented. CDF/SLOCFD will provide fire protection backup for larger fires that cannot be extinguished using the project's portable suppression equipment (CESFa, section 5.17.2.1.4)

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the California Fire Code, all applicable recommended NFPA standards (including Standard 850, which addresses fire protection at electric generating plants), and all Cal-OSHA requirements. Fire suppression elements in the proposed plant will include both fixed and portable fire extinguishing systems.

A dedicated 250,000-gallon portion of the 740,000-gallon raw water storage tank located on the project site will supply water to extinguish fires. A diesel and electric pump system will ensure a continuous adequate water supply to the fire protection water-piping network, which includes fire hydrants throughout the site, and an automatic

fire suppression system in the control, office, warehouse, and water treatment buildings (CESFa, Sections 3.4.9 and 5.17.2.2.5).

A carbon dioxide (CO_2) fire protection system will be provided for the steam turbine generators and accessory equipment (CESFa, Sections3.4.9). The system will have fire detection sensors that will trigger alarms, turn off ventilation, close ventilation openings, and automatically activate the system. The remainder of the solar field is nonflammable.

In addition to the fixed fire protection system, smoke detectors, flame detectors, temperature detectors, appropriate class of service portable extinguishers, and fire hydrants must be located throughout the facility at code-approved intervals. These systems are standard requirements of the fire code, NFPA, and are described in the AFC and staff has determined that they will ensure adequate fire protection.

The applicant would be required by conditions of certification **WORKER SAFETY-1** and **-2** to provide a final Fire Protection and Prevention Program to both staff and the CDF/SLOCFD prior to the construction and operation of the project in order to confirm the adequacy of proposed fire protection measures.

Emergency Medical Services Response

A statewide survey was conducted by staff to determine the frequency of emergency medical services (EMS) and off-site fire-fighters for natural gas-fired power plants in California. The purpose of this analysis was to determine what impact, if any, power plants might have on local emergency services. Staff concludes that incidents at power plants requiring fire or EMS responses are infrequent and represent an insignificant impact on local fire departments, except, in rare instances, where a rural fire department has a primarily volunteer fire-fighting staff. Because CESF will not use natural gas, flammable heat transfer fluid, or large amounts of hazardous materials, staff expects that the frequency of any incidents requiring fire or EMS responses will be even less than for a more convential power plant.

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 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 defibrillator; 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 including airports, factories, and government buildings, all of which maintain on-site cardiac defibrillation devices. Therefore, staff concludes that with the availability of modern cost-effective cardiac defibrillation devices, it is proper in a power plant environment to maintain these devices on-site in order to treat cardiac arrythmias resulting from industrial accidents or other non-work related causes. Therefore, an additional condition of certification, **WORKER SAFETY-5**, is proposed so that a portable automatic cardiac defibrillator will be located on site.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the construction and operation of CESF to determine what, if any, impact it could have on the fire and emergency service capabilities of the CDF/SLOCFD. Because incidents at power plants requiring fire or EMS responses are infrequent and represent an insignificant impact on local fire departments, combined with the plan for CESF to not use natural gas, flammable heat transfer fluid, or large amounts of hazardous materials, staff expects that the frequency of any incidents requiring fire or EMS responses will be even less than for a more convential power plant. Proprosed power plants in the vicinity of CESF (Optisolar's Topaz Solar Farm and Sun Power's California Valley Solar Ranch) would be expected to have similarly insignificant impacts. Staff agrees with the applicant that combined impacts would not be significant and that local services would adequately provide emergency services.

CONCLUSIONS

Staff concludes that if the applicant for the proposed CESF project provides project construction safety and health and project operations and maintenance safety and health programs, as required by conditions of certification **WORKER SAFETY-1**, and **-2**; and fulfills the requirements of conditions of certification **WORKER SAFETY-3** through **-6**, CESF would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the proposed project would not have significant impacts on local fire protection services.

PROPOSED CONDITIONS OF CERTIFICATION

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 Emergency Action Plan; and
- A Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, 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 CDF/SLOCFD for review and comment prior to submittal to the CPM for approval.

Verification: At least thirty (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. The project owner shall provide a copy of a

letter to the CPM from the CDF/SLOCFD stating the Fire Department's comments on the Construction Fire Prevention Plan and Emergency Action Plan.

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 Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Program (8 CCR § 3221); and;
- Personal Protective Equipment Program (8 CCR §§ 3401-3411).

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to the CPM for review and comment concerning compliance of the program with all applicable Safety Orders. The Operation Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the CDF/SLOCFD for review and comment.

Verification: At least thirty (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. The project owner shall provide a copy of a letter to the CPM from the CDF/SLOCFD stating the Fire Department's comments on the Operations Fire Prevention Plan and Emergency Action Plan.

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 over-all 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 & 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, emergency response reports for injuries, and inform the CPM of safety-related incidents; and
- Assure that all the plans identified in Worker Safety 1 and 2 are implemented.

Verification: At least thirty (30) 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 Worker Safety 3, implements all appropriate Cal/OSHA and 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 thirty (30) 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 cardiac defibrillator 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 thirty (30) days prior to the start of site mobilization the project owner shall submit to the CPM proof that a portable automatic cardiac defibrillator exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall prepare and implement a Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar array. These plans shall be submitted to the CPM for review and approval.

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall submit to the CPM for review and approval a copy of the Best Management Practices (BMP) for the storage and application of herbicides.

REFERENCES

California Fire Code 2007. Published by the International Fire Code Institute comprised of the International Conference of Building Officials, the Western Fire Chiefs Association, and the California Building Standards Commission. Whittier, Ca.

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ENGINEERING ASSESSMENT

FACILITY DESIGN

Erin Bright and Steve Baker

SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that the design, construction, and eventual closure of the Carrizo Energy Solar Farm and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations, and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations, and standards.

INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Carrizo Energy Solar Farm (CESF). The purpose of this analysis is to:

- verify that the laws, ordinances, regulations, and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project will be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- identification of the engineering LORS that apply to facility design;
- evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety;
- proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- conditions of certification proposed by staff to ensure that the project will be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (CESF2007a, Appendices D through G). 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	San Luis Obispo 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)

SETTING

The Carrizo Energy Solar Farm (CESF), a 177 MW solar thermal power plant facility utilizing Compact Linear Fresnel Reflector technology, would be built on a 640-acre section on the Carrizo Plain in eastern San Luis Obispo County. The site lies in Seismic Risk Zone 4. For more information on the site and related project description, please see the **Project Description** section of this document. Additional engineering design details are contained in the AFC (CESF2007a, Appendices D through H).

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 will verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access, in addition to the criteria for designing and constructing linear support facilities such as natural gas and electric transmission interconnections. The applicant proposes the use of accepted industry standards (see CESF AFC, Appendices D through G, for representative lists 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; used for the storage, containment, or handling of hazardous or toxic materials; or capable of becoming 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.

The CESF 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 (CESF2007a, AFC § 3.7.4, Appendix 2C) describes a quality control 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, audits, and testing. Implementation of this quality assurance/quality control (QA/QC) program will ensure that the CESF is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under Section 104.1 in Appendix Chapter 1 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 103.3 in Appendix Chapter 1 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, section 108 in Appendix Chapter 1, 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, consistent with CBC section 108, pays in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff will invite San Luis Obispo 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) that could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval process.

FACILITY CLOSURE

The removal of a facility from service (decommissioning) when it reaches the end of its useful life ranges from “mothballing” to the removal of all equipment and appurtenant facilities and subsequent restoration of the site. Future conditions that could affect decommissioning are largely unknown at this time.

In order to ensure that decommissioning will be completed in a manner that is environmentally sound, safe, and protects the public health and safety, the applicant shall submit a decommissioning plan to the Energy Commission for review and approval before the project’s decommissioning begins. The plan shall include a discussion of:

- proposed decommissioning activities for the project and all appurtenant facilities that were constructed as part of the project;
- all applicable LORS and local/regional plans and proof of adherence to those applicable LORS and local/regional plans;
- the activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities; and
- decommissioning alternatives other than complete site restoration.

Satisfying the above requirements should serve as adequate protection, even in the unlikely event that the project is abandoned. Staff has proposed general conditions (see **General Conditions**) to ensure that these measures are included in the Facility Closure Plan.

CONCLUSIONS AND RECOMMENDATIONS

1. The laws, ordinances, regulations, and standards (LORS) identified in the AFC and supporting documents directly apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that the CESF 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** section 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.

CONDITIONS OF CERTIFICATION

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 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 laws, ordinances, regulations and standards (LORS) in effect at the time initial design plans are submitted to the chief building official (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 (2007 CBC, Appendix Chapter 1, § 101.2, Scope). 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 compliance project manager (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 (2007 CBC, Appendix Chapter 1, § 110, Certificate of Occupancy).

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, 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 within 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
Steam Turbine Generator Building Foundation and Connections	2
Control and Administration Building Foundation and Connections	1
Air Cooled Condenser Foundation and Connections	2
Demineralized Water Treatment Facility Foundation and Connections	1
Warehouse and Shop Building Foundation and connections	1
Steam Drums and Support Structures Foundation and Connections	22
Blowdown Tank Foundation and connections	2
Vacuum Ejector Skid Foundation and Connections	2
Condensate Tank Foundation and Connections	2
Generator Step Up Transformer Foundation and Connections	2
Auxiliary Transformer Foundation and Connections	2
Standby Transformer Foundation and Connections	1
Raw Water-Fire Water Tank Foundation and Connections	1

Equipment/System	Quantity (Plant)
Service Water Tank Foundations and Connections	1
Demineralized Water Tank Foundation and Connections	1
Fire Water Pump Building Foundations and Connections	1
Filter Station Foundation and Connections	1
Pipe Rack Foundation and Connections	2
Solar Field Reflectors and Receivers Foundations and Connections	1 Lot
Recirculation Pumps Foundations and Connections	1 Lot
Steam Separator Tanks Foundations and Connections	1 Lot
Steam Drum and Support Structures Foundations and Connections	22
Solar Field Pipe Racks and Electrical Raceway Foundations and Connections	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 (2007 CBC, Appendix Chapter 1, § 108, Fees; Chapter 1, Section 108.4, Permits, Fees, Applications and Inspections), 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, structural engineer, or civil engineer, as the resident engineer in charge of the project (2007 California Administrative Code, § 4-209, Designation of Responsibilities). 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 resident engineer 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 resident engineer 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 shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the resident engineer 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 within a 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 resident engineer and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the resident engineer and other delegated engineer(s) within five days of the approval.

If the resident engineer 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 (2007 CBC, Appendix Chapter 1, § 104, Duties and Powers of Building Official).

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; and 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 resident engineer 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 (2007 CBC, Appendix J, § J104.3, Soils Report; Chapter 18, § 1802.2, Foundation and Soils Investigations);

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2007 CBC, Appendix J, section J105, Inspections, and the 2007 California Administrative Code, section 4-211, Observation and Inspection of Construction (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 resident engineer.

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 (2007 CBC, Appendix Chapter 1, § 114, Stop Orders).

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 California Administrative Code, section 4-211, Observation and Inspection of Construction (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 resident engineer 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 within a 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 within a 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, 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, Chapter 17, Section 1704, Special Inspections; Chapter 17A, Section 1704A, Special Inspections; and Appendix Chapter 1, Section 109, Inspections. 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. Observe the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and resident engineer. All discrepancies shall be brought to the immediate attention of the resident engineer for correction, then, if uncorrected, to the CBO and the CPM for corrective action (2007 CBC, Chapter 17, § 1704.1.2, Report Requirements); and

4. Submit a final signed report to the resident engineer, 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 within a 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 (2007 CBC, Appendix Chapter 1, § 109.6, Approval Required; Chapter 17, § 1704.1.2, Report Requirements). 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 an alternative site approved by the CPM during the operating life of the project (2007 CBC, Appendix Chapter 1, § 106.3.1, Approval of

Construction Documents). 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" files (Adobe .pdf 6.0), 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 investigation reports required by the 2007 CBC, Appendix J, section J104.3, Soils Report, and Chapter 18, section 1802.2, Foundation and Soils Investigation.

Verification: At least 15 days (or within a 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 (2007 CBC, Appendix Chapter 1, § 114, Stop Work Orders).

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, Appendix Chapter 1, section 109, Inspections, and Chapter 17, section 1704, Special Inspections. 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 (2007 CBC, Chapter 17, § 1704.1.2, Report Requirements). 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 (2007 CBC, Chapter 17, § 1703.2, Written Approval).

Verification: Within 30 days (or within a 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 (2007 CBC, Appendix Chapter 1, § 109.6, Approval Required);

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 (2007 California Administrative Code, § 4-210, Plans, Specifications, Computations and Other Data);

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 (2007 CBC, Appendix Chapter 1, § 106.3.4, Design Professional in Responsible Charge); and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS (2007 CBC, Appendix Chapter 1, § 106.3.4, Design Professional in Responsible Charge).

Verification: At least 60 days (or within a 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 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, Chapter 17, section 1704, Special Inspections, and section 1709.1, Structural Observations.

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 (2007 CBC, Chapter 17, § 1704.1.2, Report Requirements). 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 necessary to obtain the 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 (2007 CBC, Appendix Chapter 1, § 106.1, Submittal Documents; § 106.4, Amended Construction Documents; 2007 California Administrative Code, § 4-215, Changes in Approved Drawings and Specifications).

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, Chapter 3, Table 307.1(2),

shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or within a 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 (2007 CBC, Appendix Chapter 1, § 106.1, Submittal Documents; § 109.5, Inspection Requests; § 109.6, Approval Required; 2007 California Plumbing Code, § 301.1.1, Approvals).

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 (2007 CBC, Appendix Chapter 1, § 106.3.4, Design Professional in Responsible Charge), 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
- San Luis Obispo County codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency (2007 CBC, Appendix Chapter 1, § 103.3, Deputies).

Verification: At least 30 days (or within a 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 (2007 CBC, Appendix Chapter 1, § 109.5, Inspection Requests).

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 within a 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 (2007 CBC, Appendix Chapter 1, § 109.3.7, Energy Efficiency Inspections; § 106.3.4, Design Professionals in Responsible Charge).

Verification: At least 30 days (or within a 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 (2007 CBC, Appendix Chapter 1, § 106.1, Submittal Documents). 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 (2007 CBC, Appendix Chapter 1, § 109.6, Approval Required; § 109.5, Inspection Requests). 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 within a project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above-listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

REFERENCES

CESF2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

GEOLOGY AND PALEONTOLOGY

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

SUMMARY OF CONCLUSIONS

The proposed Carrizo Energy Solar Farm (CESF) would be located in an active geologic area on the Carrizo Plain and southwest of the San Andreas Fault in Southern California. Because of its geologic setting, the site could be subject to intense levels of earthquake-related ground shaking. While the potential for earthquake ground rupture is minimal, the site is located approximately 5 miles southwest of the San Andreas fault zone and within 5 miles of several other active faults to the southwest. The San Juan fault zone is located about 5.5 miles to the west and extends in a north-northwest orientation. The Big Spring thrust fault is located approximately 5 miles southwest of the site. The effects of strong ground shaking must be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC, 2007) and a project geotechnical report. The California Building Code (CBC) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A design-level geotechnical investigation required for the project by the CBC, and proposed Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**, in the **Facility Design** section of this document, would present standard engineering design recommendations for mitigation of potential expansive clay soils, as well as excessive settlement due to compressible soils and possible liquefaction potential.

There are no known viable geologic or mineralogical resources at the CESF site. Paleontological resources have been documented within 1 mile of the project, but no significant fossils were found during cursory field evaluations at the plant site, near ancillary facilities or at the off-site lay-down area and temporary access road (CESF, 2007a). Potential impacts to paleontological resources due to construction activities 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 cumulative impacts to the project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project. It is staff's opinion that the CESF can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety, to the extent practical.

INTRODUCTION

In this section, Energy Commission staff discusses the potential impacts of geologic hazards on the proposed CESF as well as geologic, mineralogic, and paleontologic resources. Staff's objective is to ensure that there would be no consequential adverse impacts to significant geological and paleontological resources during the project construction, operation, and closure and that operation of the plant would not expose occupants to high-probability geologic hazards. A brief geological and paleontological overview is provided. The section concludes with staff's proposed monitoring and

mitigation measures for geologic hazards and geologic, mineralogic, and paleontologic resources, with the proposed Conditions of Certification.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Applicable laws, ordinances, regulations and standards (LORS) are listed in the Application for Certification (AFC) (CESF, 2007a). The following briefly describes the current LORS for both geologic hazards and resources and mineralogic and paleontologic resources.

GEOLOGY AND PALEONTOLOGY Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	The proposed CESF is not located on federal land. There are no federal LORS for geologic hazards and resources for this site.
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 Act, Public Resources Code (PRC), section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings. The site is not located within a designated Alquist-Priolo Fault 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.
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 paleontologic resources, the Energy Commission relies on guidelines from the Society for Vertebrate Paleontology (SVP), 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.

Applicable Law	Description
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	
San Luis Obispo County General Plan, 2008	Defines criteria for site resource evaluation for Planning and Building. Relevant sections include the Energy, Safety and Conservation elements of the plan.

SETTING

The proposed CESF would be constructed on approximately 640 acres comprising the entirety of Section 28, Township 29 South, Range 18 East, adjacent to California State Route (SR) 58/Carriza Highway. The site is situated in the northwest area of the Carrizo Plain in an unincorporated area in eastern San Luis Obispo County, California. A temporary construction lay-down area encompassing approximately 380 acres would be located in the northern portion of Section 33 directly to the south of the proposed CESF project site. The power plant would be capable of generating up to 177 megawatts (MW) of electricity from approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines, and associated steam drums, steam turbine generators (STGs), air-cooled condensers (ACCs), and infrastructure. The facility would consist of two 93 MW (gross) turbines driven by steam produced from the solar concentrators and delivered to eight steam drums located in the field and two steam drums located in the power block. Two large air-cooled condenser units would essentially avoid consumptive water use related to cooling.

Water for the proposed CESF project would be supplied from an existing 591-foot-deep ground water well located near the center of Section 28. Water would be pumped to a 450,000 gallon combination raw water/fire water storage tank. Water from there would be pumped to a water treatment system. On-site sewage disposal is planned with a septic tank and sub-surface leach field system. Storm water would be collected in a series of swales, ditches, culverts, and site grading to natural drainages away from the facility.

The entire project would be enclosed in a 10-foot-high chain-link fence. Approximately 7 miles of paved and gravel-surfaced roads would be needed to access the facilities.

The temporary 380-acre construction lay-down area, just south of CESF and across SR-58 would be constructed at the start of the project. Approximately 850 linear feet of new 230kV transmission line would connect the project to the existing Pacific Gas & Electric (PG&E) Morro Bay-Midway 230 kV transmission line right-of-way.

REGIONAL SETTING

The proposed CESF site is located at the north end of the Carrizo Plain, a northeast-southwest trending narrow plain and alluvial valley. The valley is bordered by the La Panza Range to the southwest, the Caliente Range to the south, and to the northeast

by the Temblor Range. The region is part of the southern portion of the Coast Ranges geomorphic province (Norris and Webb, 1990). The geomorphic province is characterized by northwest-trending right-lateral strike-slip faults with the San Andreas Fault being located approximately 5 miles east of the CESF site. The Carrizo Plain is bounded to the southwest by the Big Spring Thrust Fault. Located farther to the west is the Chimineas Fault (northwest-trending right-lateral strike-slip), La Panza reverse fault, Rinconada strike-slip fault and, to the northwest, the San Juan Fault strike-slip fault zone. The Coast Ranges show strong northwest-southeast tends induced by folds and faults by the same trend. The geologic history of the Coast Ranges is intricately interwoven with tectonics of the San Andreas and other major faults (Norris and Webb, 1990).

The power plant site is located on alluvial fan and fluvial deposits shed from the nearby Temblor Range northeast of the Carrizo Plain and from sediments shed from the La Panza and Syncline Hill area to the west and southwest. The Quaternary sediments unconformably overlie the same folded and thrust faulted Tertiary deposits in a shallow syncline, which in turn overlies crystalline Gneiss basement rocks of Precambrian age (Bartow, 1991). The Quaternary sediments are composed of sand, silt, gravel and mud in stream channels, terraces, alluvial fans and locally include colluvium. Younger deposits are generally unconsolidated to semiconsolidated, and older sediments are more consolidated with variable clay development.

PROJECT SITE DESCRIPTION

The power plant site is located in south-central California, and is situated at the north end of the Carrizo Plain. **GEOLOGY AND PALEONTOLOGY Table 2** summarizes the stratigraphic nomenclature of Pleistocene to Holocene units mapped at the project site. Mapping by Bartow (1991) and Dibblee (1973) of Quaternary sediments correlates well across the project site. All units, except for eolian sands (Qs and Qye), contain similar sand, silt, gravel and mud in stream channels, terraces and alluvial fans. Secondary criteria, such as degree of dissection (erosion) and soil development, were therefore used by individual authors to define the relative age and stratigraphic position of each mapped unit. Correlations shown in **GEOLOGY AND PALEONTOLOGY Table 2** between units mapped by the authors are based on their interpretation of age, degree of dissection and soil development. In all cases, the surface few feet of the surface soils profile has been modified by agricultural use, including plowing and/or discing.

GEOLOGY AND PALEONTOLOGY Table 2
STRATIGRAPHIC UNITS IN THE VICINITY OF CARRIZO, CALIFORNIA

Bartow (USGS, 1991)	Dibblee (1973)	Formation	Age	Degree of Dissection	Soil Development
Qya			Holocene and Pleistocene	slightly	tilling/disking
Qta			Holocene and Pleistocene	slightly	negligible
Qtp	Qtp	Paso Robles Formation	Pleistocene and Pliocene?	slightly	negligible

Bartow (USGS, 1991)	Dibblee (1973)	Formation	Age	Degree of Dissection	Soil Development
	Qa		Holocene	slightly	tilling/disking
Qoa			Pleistocene	slightly	negligible

Several active and potentially active faults related to regional strike-slip faulting and compressional tectonics are present within 70 miles of both the proposed CESF site and the off-site lay-down area. The various faults are listed in **GEOLOGY AND PALEONTOLOGY Table 3**, along with the type, orientation (strike), most recent movement and distance from the project site. The sense of movement and age of last activity were derived from a number of sources (CDMG, 2003, 2000, 1994, 1986; CDG, 1977; CGS, 2002a; Norris and Webb, 1990).

EQFAULTS Version 3.00, a computer program for the deterministic estimation of peak site acceleration using three-dimensional articulated planar elements (faults), was used to model seismogenic sources (Blake, 2006a). The site latitude and longitude inputs were 35.3734 degrees and -120.0486, respectively; the search radius was 65 miles. The attenuation relationship used was that recommended by Boore and others (1997) for Site Class D. The various faults are listed in **GEOLOGY AND PALEONTOLOGY Table 3**, along with the distance from the project site and the maximum earthquake magnitude. The peak site acceleration, fault type, strike, and fault class are also given.

GEOLOGY AND PALEONTOLOGY Table 3
ACTIVE FAULTS IN THE PROJECT AREA

Fault Name	Distance From Site mi (km)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Fault Type and Strike	Fault Class	Most Recent Movement
San Andreas – Cholame	5.5 (8.8)	6.9	0.359	rl-ss	A	
San Andreas – 1857 Rupture	5.5 (8.8)	7.8	0.577	rl-ss	A	1/9/1857
San Juan	5.8 (9.4)	7.0	0.365	rl-ss	B	
San Andreas – Carrizo	11.6 (18.6)	7.2	0.259	rl-ss	A	
Rinconada	26.3 (42.4)	7.3	0.148	rl-ss	B	9/5/1922
San Luis Range (S. Margin)	27.6 (44.4)	7.0	0.148	r, 45 N	B	
Los Osos	28.8 (46.4)	6.8	0.129	r, 45 SW	B	
San Andreas – Parkfield Segment	29.4 (47.3)	6.7	0.099	rl-ss	A	6/28/1966
Great Valley 14	38.4 (61.8)	6.4	0.084	r, 15 W	B	
Casmalia (Orcutt Frontal Fault)	41.5 (66.8)	6.5	0.083	r, 75 SW	B	
Lions Head	44.9 (72.2)	6.6	0.083	r, 75 NE	B	
Los Alamos – W. Baseline	45.0 (72.5)	6.8	0.091	r, 30 S	B	
Hosgri	48.5 (78.1)	7.3	0.092	rl-ss	B	
Great Valley 13	50.0 (80.4)	6.5	0.072	r, 15 W	B	
North Channel Slope	51.9 (83.5)	7.1	0.096	r, 26 N	B	

Fault Name	Distance From Site mi (km)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Fault Type and Strike	Fault Class	Most Recent Movement
North Channel Slope	51.9 (83.5)	7.1	0.096	r, 26 N	B	
Pleito Thrust	51.9 (83.5)	7.2	0.101	r, 45 S	B	
San Andreas (Creeping)	52.1 (83.9)	6.5	0.057	rl-ss	A	
Santa Ynez (West)	55.7 (89.7)	6.9	0.067	ll-ss	B	
White Wolf	57.2 (92.0)	7.2	0.094	r-ll-o, 60 S	B	
Big Pine	61.0 (98.2)	6.7	0.056	ll-ss	B	
M. Ridge-Arroyo Parida-Santa Ana	61.4 (98.8)	6.7	0.068	r, 60 N	B	
ss = strike slip, r = reverse, n = normal, rt = right lateral, ll = left lateral, o = oblique						

GEOLOGY AND PALEONTOLOGY Table 4 summarizes the historic seismicity in the region between 1800 and 2008. EQSEARCH Version 3.00 software was used to search an abbreviated and modified version of the published CGS earthquake catalog for California (Blake, 2006b). The site latitude and longitude inputs were 35.3734 degrees and -120.0486 degrees, respectively. The range of historic earthquake magnitudes selected was 5.5 to 9.0, and the search radius was 65 miles. The attenuation relationship used was that recommended by Boore, et al. (1997) for Site Class D. The location of each seismic epicenter was obtained from the California Historical Online Database (CGS, October 2007) and the Fault Activity Map of California (CDMG, 1994). The faults evaluated for this site are summarized in **GEOLOGY AND PALEONTOLOGY Table 3**.

GEOLOGY AND PALEONTOLOGY Table 4
ESTIMATED DETERMINISTIC PEAK SURFACE ACCELERATIONS

Latitude North	Longitude West	Date	Depth (km)	Earthquake Magnitude	Peak Site Surface Acc. (g)	Site Modified Mercali Scale Intensity	Approx. Distance (mi [km])	Location of Epicenter
35.300	119.800	01/09/1857	0.0	7.9	0.312	IX	14.9 (24.0)	Fort Tejon
35.750	120.250	03/10/1922	0.0	6.5	0.092	VII	28.4 (45.6)	San Luis Obispo
35.800	120.330	06/08/1934	0.0	6.0	0.062	VI	33.4 (53.8)	Parkfield
35.250	120.670	00/00/1830	0.0	5.7	0.050	VI	36.0 (58.0)	San Luis Obispo, Santa Margarita
35.300	120.700	12/07/1906	0.0	5.90	0.054	VI	37.0 (59.6)	San Luis Obispo
35.170	120.750	12/01/1916	0.0	5.70	0.044	VI	42.0 (67.5)	Pismo Beach
34.800	120.400	12/12/1902	0.0	5.70	0.043	VI	44.3 (71.3)	Los Alamos
35.950	120.500	06/28/1966	0.0	5.50	0.037	V	47.2 (75.9)	Parkfield
34.700	120.300	07/31/1902	0.0	5.50	0.036	V	48.6 (78.2)	Los Alamos
34.700	120.300	01/12/1915	0.0	5.50	0.036	V	48.6 (78.2)	Los Alamos
34.900	120.700	11/04/1927	0.0	7.50	0.102	VII	49.2 (79.2)	40 km west of Lompoc
36.000	120.500	03/03/1901	0.0	5.50	0.035	V	50.1 (80.7)	Parkfield
36.000	120.500	02/02/1881	0.0	5.60	0.037	V	50.1 (80.7)	Parkfield

Latitude North	Longitude West	Date	Depth (km)	Earthquake Magnitude	Peak Site Surface Acc. (g)	Site Modified Mercali Scale Intensity	Approx. Distance (mi [km])	Location of Epicenter
36.151	120.049	08/04/1985	6.0	5.80	0.039	V	53.7 (86.4)	North Kettleman Hills
34.600	120.400	08/01/1902	0.0	6.30	0.048	VI	57.0 (91.7)	Los Alamos
36.220	120.290	05/02/1983	0.0	5.60	0.032	V	60.0 (96.5)	Coalinga
36.220	120.290	05/02/1983	0.0	6.70	0.057	VI	60.0 (96.5)	Coalinga
36.220	120.400	07/22/1983	0.0	6.00	0.039	V	61.7 (99.2)	Coalinga
35.000	119.033	07/21/1952	0.0	5.60	0.031	V	62.8 (101.1)	Kern County
35.000	119.017	01/12/1954	0.0	5.90	0.036	V	63.7 (102.4)	West of Wheeler Ridge
35.000	119.017	07/21/1952	0.0	7.0	0.092	VII	63.7 (102.4)	Kern County
35.333	118.917	08/22/1952	0.0	5.80	0.034	V	63.8 (102.6)	Bakersfield
35.000	119.000	07/21/1952	0.0	6.40	0.046	VI	64.5 (103.9)	Kern County

In addition to reverse and thrust faulting, active anticlinal upwarping is associated with compressional tectonics that are responsible for the formation of the Transverse Ranges. The nearest expressions of this crustal shortening are the Hubbard Hill and the La Panza Range located approximately three to eleven miles west of the project site.

Ground water depth on the CESF site varies from approximately 30 feet below ground surface in the power generation area, to approximately 29 to 31 feet below ground surface along the center of the eastern section boundary, to 24 feet below ground surface at the southeast section corner and 13.5 feet below ground surface at the southwest section corner (CESF, 2007a). A preliminary geotechnical report was included as Appendix J of the AFC (CESF, 2007a). Data, such as boring logs and soils testing results from this document, were reviewed. It would be necessary that a design level geotechnical investigation be completed per CBC 2007 and proposed **GEN-1**, **GEN-5**, and **CIVIL-1** Conditions of Certification, in the **Facility Design** section, in order to fully evaluate the geologic conditions at the power plant site, prior to construction.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

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

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

No federal LORS concerning geologic hazards and geologic and mineralogic resources apply to this project. 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 geologic hazard include evaluating each hazard's potential impact on the design and construction of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, seiches, and others, as may be dictated by site-specific conditions.

The California Environmental Quality Act (CEQA) guidelines, Appendix G, provide a checklist of questions that lead agencies typically address.

- Section (V) (c) includes guidelines that determine if a project would either directly or indirectly destroy a unique paleontological resource or site, or a unique geological feature.
- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geologic hazards.
- Sections (X) (a) and (b) concern the project's effects on mineral resources.

Staff has reviewed geologic and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if geologic and mineralogic resources exist in the area. When available, staff also reviewed the operating procedures of the proposed facility—in particular ground water extraction and mass grading—to determine if those operations could adversely affect geologic and mineralogic resources.

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

DIRECT/INDIRECT IMPACTS AND MITIGATION

Ground shaking, limited liquefaction potential, and expansive clays represent the main geologic hazards at this site. These potential hazards can be effectively mitigated through **Facility Design** by incorporating recommendations contained in a project geotechnical report. Proposed Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section should also aid in mitigating these impacts to a less than significant level.

No viable geologic or mineralogic resources are known to exist within 4000 feet of the CESF site, the off-site lay-down area or project linears. The CESF site is mapped as Mineral Resource Zone (MRZ) 3 (CDMG, 1991). MRZ-3 refers to areas containing known or inferred mineral occurrences of undetermined mineral resource significance. The Farm Camp Quarry No. 5, a surficial gypsum-anhydrate quarry, is located approximately 8 miles to the southeast and nearby California Valley Mine also produced gypsum for agricultural use (CDMG, 1999). The Navajo Rock and Sand quarry, operated by Navajo Concrete since 1976, is located approximately 11.5 miles west of the site, producing sand and gravel. Mining in this region began in the 1800's when alluvium was mined for placer gold. A gold placer operation was reported on Navajo creek in 1925 (CDMG 1989, 1998).

Numerous oil fields are located in the hills east of the site near the San Andreas Fault. The majority of the wells drilled were abandoned or not developed. Exploratory wells

have been drilled approximately six miles to the southeast, and at least 16 wells within 1- to 3-miles northwest, west, and southwest of the site. None of these wells are active (DOGGR 2005).

Younger alluvium and alluvial fan deposits (Qya) (Holocene and Pleistocene), which represent all soils that are mapped at the surface or beneath an agricultural soil veneer (which includes a plowed zone) would potentially be impacted by project grading and trenching. Older alluvium and alluvial fan deposits (Qoa) (Pleistocene in age) could also potentially be impacted. The Pleistocene deposits are considered to have a high paleontological sensitivity. The possibility of impacting significant paleontological resources in underlying Paso Robles formation (QTp) (Pleistocene and Pliocene age), if encountered, is high, because several vertebrate fossil localities are present within one mile of the site (McLeod, 2008). No important paleontological resources were observed on the CESF site or at the off-site lay-down area during the paleontological field survey conducted for the CESF (CESF, 2007a). The closest fossil locality to the project site is in the northwest corner of Section 3, Township 30 South, Range 18 East, approximately one mile due south of the southeast corner of the CESF site and approximately 0.5 miles due south of the southeast corner of the lay-down site. Fossil specimens of mastodon *(Mammut)*, bison (*Bison latifrons),* and camel (*Camelops cf. C. hesternus),* were recovered from the Paso Robles Formation at this locale. The fossil specimens were encountered in the bottom of a stream bed. The next closest reported fossil locale is located approximately 2.5 miles northwest of the CESF site (Holroyd, 2008). This specimen consisted of an incomplete Mammalia skeleton. The surficial Holocene alluvium is not expected to contain significant vertebrate fossils, at least in the uppermost layers.

Since the proposed CESF site construction would include significant amounts of grading, foundation excavation, possible deep foundations, and utility trenching, staff considers the probability that paleontological resources would be encountered during such activities to be high if such activity extends into the Paso Robles Formation underlying the younger surficial Quaternary Alluvium. This assessment is based on SVP criteria. 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 paleontologic resource specialist or PRS).

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 LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontologic resources.

Since fossil vertebrates have been reported within 1 mile of the project site and depositional conditions appear favorable in both the Quaternary alluvium and the Paso Robles Formation, there is a potential for adverse impacts to paleontological resources if excavation of this site is not properly monitored.

Based on information available, it is staff's opinion that the potential for significant adverse impacts to the project from geologic hazards, and to potential geologic,

mineralogic, and paleontologic resources from the proposed project, can be mitigated to reduce impacts to a less than significant level.

GEOLOGICAL HAZARDS

The AFC (CESF, 2007a) provides documentation of potential geologic hazards at the CESF site. Review of the AFC, coupled with staff's independent research, indicates that the possibility of life-threatening geologic hazards at the plant site, during its practical design life, would be low. However, other geologic hazards, such as potential for expansive clay soils and settlement due to compressible soils, hydrocompaction, or dynamic compaction, must be addressed in a design-level geotechnical report per CBC (2007) requirements, prior to construction.

Staff's independent research included the review of available geologic maps, reports, and related data of the CESF plant site. Geological information was available from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG; now CGS), the U.S. Geological Survey (USGS), and other governmental organizations.

Faulting and Seismicity

Energy Commission staff reviewed the CDMG publication *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions* (CDMG, 1994) and Alquist-Priolo Special Studies Zone mapping and reports (CDMG, 2003; CGS, 2002a; and Hart and Bryant, 1999). No active faults are shown on published maps as crossing the boundary of new construction on the proposed CESF site or on the temporary construction lay-down area. The closest mapped active fault to the proposed plant site is the San Andreas Fault located 5.5 miles to the northeast. This section known as the Cholame-Carizzo segment of the San Andreas Fault zone is the only geologic structure within 26 miles of the proposed project facilities that has experienced historic surface rupture (within 200 years) (CDMG, 1994; CGS, 2007). The right-lateral strike-slip San Juan fault zone is located approximately 5.5 miles to the west and strikes in a north-northwest orientation. The northern section of the San Juan fault zone consists primarily of the Red Hills Fault and the Gillis Canyon Fault which both display Holocene surface rupture. The southern portion of the fault is thought to be less active (SCEC, 2007). The right-lateral strike-slip Rinconada Fault (and Nacimiento Fault, extending parallel and southeast from the Rinconada Fault) shows similar orientation and sense of movement to the San Andreas Fault.

A concealed thrust fault trending northwest is interpreted to be approximately ¼ mile west of the southwest corner of the proposed plant site (Bartow, 1991). This fault is considered inactive because it is an older bedrock fault and does not extend through the alluvium. Potential for earthquakes to be generated by older bedrock faults is considered to be very low.

The Cholame-Carizzo segment of the San Andreas Fault is a Type A fault with a slip rate 20 to 35 mm per year (SCEC, 2007; CGS, 2002a; CDMG, 1994). The Rinconada Fault is a Type B fault with a slip-rate of 1 mm per year (CGS, 2002a), although Hart (1985) estimates a long term slip-rate of about 3 mm/yr. The last most recent surface rupture on the Rinconda was late Quaternary (SCEC, 2008). San Juan fault is a Type C fault with slip-rate of 1 mm per year (CGS, 2002). Type A faults 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 Alquist-Priolo Act of 1973 and subsequent California state law (California Code of Regulations, 2001) require that all occupied structures be set back 50 feet or more from the surface trace of an active fault. Since no active faults have been documented within the proposed CESF power plant site, faults would not need to be precisely located by trenching and occupied structures would not require setbacks.

Twenty-three earthquakes of Magnitude 5.5 (M5.5) or greater have occurred on active faults between 5.5 and 65 miles of the site (CGS, 2007). The most significant relative to the CESF site is associated with ground rupture associated with the massive Ft. Tejon earthquake (1857, M7.9) that took place along the Parkfield, Cholame-Carizzo and the Mojave segments of the San Andreas Fault (CDMG, 1994).

The soil profile for this site is assumed to be Type D. However, a project-specific geotechnical report is needed to confirm the soil profile and provide appropriate seismic design parameters.

The estimated peak horizontal ground acceleration for the power plant is 0.58 times the acceleration of gravity (0.58g) for bedrock acceleration based on 10 percent probability of exceedence in 50 years, under 2007 CBC criteria. The applicant has recognized this potential ground acceleration from a seismic event as part of its design criteria for the CESF project.

Liquefaction

Liquefaction is a condition where a cohesionless soil may lose shear strength because of sudden increase in pore water pressure caused by an earthquake. The liquefaction hazards map in the San Luis Obispo General Plan (San Luis Obispo County Department of Planning and Building, 1999) shows the site within an area of high liquefaction potential. This designation is probably due to the highly variable nature of the Carrizo Plain, and does not necessarily indicate widespread or severe liquefaction potential. Ground water depth of 13.5 to 31 feet were recorded in the bore holes during exploration of the site (URS, 2007). Potential liquefiable zones could occur in loose, saturated sandy soils not deeper than about 40 feet below the ground surface. The soils within this depth were mostly observed to be clay and sandy clay with minor sand layers present. However, soils in the southwest portion of the site included 10 feet of fine to medium sand with about 30 percent clay and silt-sized particles. The uncorrected standard penetration test values (blowcounts) are relatively low in this layer, suggesting that liquefaction might be possible, during a large earthquake. The relatively high clay content, along with additional exploration with rotary-mud drilling, could well demonstrate that these materials have no liquefaction potential. Liquefaction potential on the CESF site should be addressed in a design-level geotechnical report, per CBC (2007) and **GEN-1**, **GEN-5** and **CIVIL-1** requirements.

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 high fines content and high in-place density of the soils profile indicate no potential for dynamic compaction of this site.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, 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 types of materials present on this site are not prone to hydrocollapse.

Subsidence

Local subsidence or settlement may occur when areas containing compressible soils are subjected to foundation loads. The preliminary geotechnical investigation (URS, 2007) indicates some potential for excessive settlement of heavily loaded foundations. Turbine generators and other heavy equipment may need to be supported on deep foundations, either driven piles or drilled shafts. Mitigation is often accomplished by over-excavation and replacement of the compressible soils. For deep-seated conditions, deep foundations or deep ground improvement techniques are commonly used.

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. The nearest known petroleum or gas fields are located in Kern County roughly 12 miles northeast of the project site (CDC, 2001). Untreated process water supplies would be obtained from an on-site existing well in the center of the site. Potable water would be supplied from the same well after it is treated on-site. The small quantities of water extracted via the on-site well are not expected to produce any significant subsidence at the CESF plant site.

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, capillary tension, water line breaks, etc. causes the clay soils to collect water molecules in their structure, which in turn causes an increase in the overall volume of the soil. This increase in volume can cause movement of overlying structural improvements.

Site-specific testing indicates a moderate to high expansion potential for near-surface and deeper clay soils on this site (URS, 2007). Mitigation is normally accomplished by over-excavation and replacement of the expansive soils. For deep-seated conditions, deep foundations are sometimes used. Lime treatment (chemical modification) is often used to mitigate expansive clays in pavement areas.

Landslides

Landslide potential at the CESF site is negligible, since the proposed energy facility is located on a broad, relatively flat to gently southwest sloping plain.

Flooding

The Federal Emergency Management Agency (FEMA) has identified the majority of the proposed CESF site and the temporary construction lay-down area as lying in

Unshaded Zone X, which is not subject to 500-year flooding. A portion of the Project site extending from approximately 570 feet south of the northeast corner of Section 28 to approximately 2,070 feet south in length and extending approximately 570 feet onto the section, is within the 100-year flood zone. Also an area approximately 420 feet wide, along the small northwest-southeast oriented drainage in the temporary construction lay-down area, is within the 100-year flood zone (FEMA, 1982). The 100-year flood elevation would need to be established as part of the normal design process. Structures should be elevated above the flood level, or otherwise protected from flooding, as appropriate and in accordance with standard engineering practice.

Tsunamis and Seiches

The proposed CESF power plant site is not near a large body of water and could not be inundated by a tsunami or seiche. Soda Lake, located approximately 10 miles to the southeast, is the nearest lake to the CESF site.

GEOLOGIC, MINERALOGIC, AND PALEONTOLOGIC RESOURCES

Energy Commission staff has reviewed applicable geologic maps and reports for this area (Bartow, 1991; CDMG, 1977, 1986, 1989, 1992, 1994,1999, 2000; Dibblee, 1971, 1973, 1999; Holroyd, 2008; McCleod, 2008; Vedder, et al., 1986). Staff did not identify any geological resources at the energy facility location or at the temporary construction lay-down area. Mining in this region began in the 1800's when alluvium was mined for placer gold. A gold placer operation was reported on Navajo creek (CDMG 1970; 1989). Sand and gravel has been produced from one pit within 11.5 miles of the site (CDMG 1999). The Farm Camp Quarry No. 5, a surficial gypsum-anhydrate quarry, located approximately 8 miles to the southeast (CDMG, 1999), produced gypsum and nearby California Valley Mine also produced gypsum for agricultural use (CDMG, 1999). Numerous inactive or closed mines are present in the vicinity, including other gypsum mines, a sodium mine at Soda Lake, gold and uranium mines in the foot hills, and scattered sand and gravel mines. The closest of these is approximately 4 miles from the proposed CESF site. The nearest known petroleum or gas fields are located in Kern County roughly 12 miles northeast of the potential site (CDC, 2001). Given the extent and depth of the clayey soil deposits at and near the proposed power plant there is low potential for this site to have economically valuable sand and gravel or other mineral deposits.

Regarding paleontological resources, Energy Commission staff has reviewed the paleontological resources assessment in Section 5.8 of the AFC (CESF, 2007a) and the attached confidential paleontologic site report (PRC, 2007). Staff has also independently reviewed paleontological literature and records, and commissioned by the Natural History Museum of Los Angeles County (McCleod, 2008) and the University of California, Museum of Paleontology (Holroyd, 2008) to conduct museum record searches. No paleontological finds have been documented on the CESF plant site or at the proposed construction lay-down area.

Older alluvial fan sediments (Qoa, Qta), which represent nearly all soils that are mapped at the surface or beneath a potentially thin veneer of agriculturally tilled/disked alluvial sediments may be impacted by project grading and trenching. These deposits are considered to have a high paleontological sensitivity. The possibility of impacting significant paleontological resources in the Pleistocene to Holocene age fan deposits is high, because several vertebrate fossil localities are present within 1 mile of the site

(McLeod, 2008). The potential to encounter significant paleontological resources in the tilled/disked upper two to four feet of the Holocene and Pleistocene, younger alluvium and alluvial fan deposits (Qya), is low to negligible because the sediments represent a severely disturbed environment and/or are too young to yield fossils of scientific significance. Any existing fill materials are considered to have negligible paleontological sensitivity because any inherent scientific value was lost once the materials were disturbed.

Two paleontological sites are documented within 2.5 miles of the proposed CESF project area. Fossil specimens of mastodon (*Mammut*), bison (*Bison latifrons*), and camel (*Camelops cf. C. hesternus*) were recovered from a locality approximately 1 mile south of the site (McLeod, 2008). The paleontological site located roughly 2.5 miles to the northwest of the project area contains vertebrate fossils of incomplete skeleton of class Mammalia (Holroyd, 2008). The Paleontological Resources Section (PRC, 2007) attached to the AFC notes that sediments of both the Paso Robles Formation and the older Quaternary alluvium have yielded fossilized remains of extinct species of continental vertebrates and other types of organisms at fossil sites in the region. A paleosol (fossil soil), ichnofossils (burrow, root casts and molds), was observed at several localities in the vicinity of the project at the top of the Paso Robles Formation. Fossil plant materials and a fossil fish scale was observed in the Quaternary alluvium, and unidentified insect eggs of pupae cases (cocoons) were found in calcareous sediments at the base of the Quaternary alluvium.

Construction Impacts and Mitigation

The design-level geotechnical investigation, required for the project by the CBC (2007), and **GEN-1**, **GEN-5**, and **CIVIL-1** of the **Facility Design** section of this document, should provide standard engineering design recommendations for mitigation of potential expansive clay soils, as well as excessive settlement due to possible liquefaction and compressible soils, as appropriate.

As noted above, no viable geologic or mineralogic resources are known to exist within 4 miles of the proposed CESF site or temporary construction lay-down area. Significant paleontological resources have been documented in older Holocene and Pleistocene alluvial sediments similar to those that are likely to be encountered during construction of the power plant. The nearest known fossil locality is 1 mile away. The older Paso Robles Formation, underlying the surficial alluvium (which could be a localized veneer of low sensitivity Holocene younger alluvium), may exhibit a high sensitivity rating with respect to containing significant paleontologic resources. Construction of the proposed project would include grading, foundation excavation, and utility trenching. Staff considers the probability of encountering paleontological resources to be generally high on the plant site, based on SVP assessment criteria, and the near surface occurrence of the sensitive geologic units. The proposed lay-down area would only exhibit high sensitivity in areas of cut. Excavations deeper than 3 feet may penetrate the cultivated zone and underlying young deposits and would have a higher probability of encountering potentially high sensitivity materials.

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, these conditions require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists

(paleontologic resource specialist; PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. When properly implemented, the Conditions of Certification yield a net gain to the science of paleontology since fossils that would not other wise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist is retained, for the project by the applicant, to produce a monitoring and mitigation plan, conduct the worker training, and provide the monitoring. During the monitoring, the PRS can and often does petition the Energy commission for a change in the monitoring protocol. Most commonly, this is a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based upon the literature and archives search, field surveys, and compliance documentation for the CESF, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the CESF. Energy Commission staff believes that the facility can be designed and constructed to minimize the effect of geologic hazards at the site during project design life and that impacts to vertebrate fossils encountered during construction of the power plant and associated linears can be mitigated to a level of insignificance.

Operation Impacts and Mitigation

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

CUMULATIVE IMPACTS AND MITIGATION

The proposed CESF is situated in an active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by the CBC (2007). Expansive materials, as well as compressible soils must be mitigated in accordance with a project geotechnical investigation and proposed Conditions of Certification **GEN-1, GEN-5, and CIVIL-1** under **Facility Design**. Paleontological resources have been documented in the general area of the proposed project and in sediments similar to those that are present on the site. However, to date, none have been found during preliminary field studies of the proposed Carrizo Energy Solar Farm. The potential impacts to paleontological resources due to construction activities would be mitigated as required by proposed Conditions of Certification **PAL-1 to PAL-7**.

Staff believes that the potential for significant adverse cumulative impacts to the proposed project from geologic hazards, during the project's design life, is low, and that the potential for cumulative impacts to geologic, mineralogic, and paleontologic resources is very low.

Based upon the literature and archives search, field surveys and compliance documentation for the CESF project, the applicant proposes monitoring and mitigation measures for construction of the CESF. Energy Commission staff agrees with the applicant that the project can be designed and constructed to minimize the effects of geologic hazards at the site, and that impacts to vertebrate fossils encountered during construction can be mitigated to levels of less than significant.

The proposed Conditions of Certification allow the Energy Commission CPM and the applicant to adopt a compliance monitoring scheme ensuring compliance with applicable LORS for geologic hazards and geologic, mineralogic, and paleontologic resources.

FACILITY CLOSURE

Facility closure activities are not expected to impact geologic or mineralogic resources since no such resources are known to exist at either the proposed project location or along its proposed linears. In addition, the decommissioning and closure of the project should not negatively affect geologic, mineralogic, or paleontologic resources since any ground disturbed during plant decommissioning and closure would already have been disturbed, and mitigated as required, during construction and operation of the project.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

The San Luis Obispo County Department of Planning and Building provided comments on the AFC in a letter dated February 17, 2008 (SLCO, 2008a). Attachment A-Key Issues, of that letter, discussed the proximity of the San Andreas Fault under the heading “Safety,” as follows:

“Given the close proximity of the San Andreas Fault line, will the project be designed in a manner to minimize safety problems should a large seismic event occur (e.g. what provisions included to address pipe breakage, does design include generators or other manual means to turn the system “off” in an emergency situation; adequate emergency water/steam shut off devices, etc.)? Are the structures designed to withstand very high wind events that occasionally occur in this area?”

The Cholame-Carizzo segment of the San Andreas Fault is approximately 5.5 miles west of the proposed CES. This is the nearest known active fault to the project so that the possibility of seismic ground rupture at this site is remote. Rupture of the Cholame-Carizzo segment of the San Andreas Fault, would be expected to generate high peak ground acceleration on the site, in the range of 0.6g. Ground shaking of this magnitude could damage piping to the extent that leakage would occur. Mitigation of similar potential mechanical problems are discussed under **Facility Design**.

CONCLUSIONS

The applicant should be readily able to comply with applicable LORS, provided that the proposed Conditions of Certification are adopted and enforced. The design, construction, and eventual demolition of the project should have no significant or cumulative adverse impact with respect to geologic, mineralogic, and paleontologic resources. Staff proposes to ensure compliance with applicable LORS through the adoption of the proposed Conditions of Certification listed below.

PROPOSED CONDITIONS OF CERTIFICATION

General Conditions of Certification with respect to engineering geology are proposed under Conditions of Certification **GEN-1, GEN-5, and CIVIL-1** in the **Facility Design**

section. Proposed paleontological Conditions of Certification follow. It is staff's opinion that the likelihood of encountering paleontologic resources is high at the plant site, along buried pipelines connecting to the plant, and in the cut zones of the temporary lay-down area. Staff would consider reducing monitoring intensity and/or establishing a depth criteria to trigger monitoring at the recommendation of the project paleontological resource specialist, following examination of sufficient, representative excavations.

PAL-1 The project owner shall provide the compliance project manager (CPM) with the resume and qualifications of its paleontological resource specialist (PRS) for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the project owner shall obtain CPM approval of the replacement PRS. The project owner shall keep resumes on file for qualified paleontological resource monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to the CPM.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the Society of Vertebrate Paleontology (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;
2. Ability to recognize and collect fossils in the field;
3. Local geological and biostratigraphic expertise;
4. Proficiency in identifying vertebrate and invertebrate fossils; and
5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. paleontologic resource monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to the CPM. The letter shall be provided to the CPM no later than one week prior to the monitor's beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM, for approval, maps and drawings showing the footprint of the power plant, construction lay-down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS and CPM. The site grading plan and plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and be at a scale in the range of 1 inch = 40 feet to 1 inch = 100 feet. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS and CPM.

If construction of the project proceeds in phases, maps and drawings may be submitted prior to the start of each phase. A letter identifying the proposed schedule of each project phase shall be provided to the PRS and CPM. Before work commences on affected phases, the project owner shall notify the PRS and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, and until ground disturbance is completed.

Verification: (1) At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

(2) If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

(3) If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within 5 days of identifying the changes.

PAL-3 The project owner shall ensure that the PRS prepares, and the project owner submits to the CPM for review and approval, a 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 would be performed according to PRMMP procedures;

2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the Conditions of Certification;

3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;

4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;

5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling;

6. A discussion of procedures to be followed in the event of a significant fossil discovery, halting construction, resuming construction, and how notifications would 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 would be met, and the name and phone number of the contact person at the institution; and

10. A copy of the paleontological Conditions of Certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to the CPM. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 Prior to ground disturbance and for the duration of construction activities involving ground disturbance, the project owner and the PRS shall prepare and conduct weekly CPM-approved training for the following workers: project managers, construction supervisors, foremen and general workers involved with or who operate ground-disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving CPM-approved worker training. Worker training shall consist of an initial in-person PRS training during the project kick-off, for those mentioned above. Following initial training, a CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. No ground disturbance shall occur prior to CPM approval of the Worker Environmental Awareness Program (WEAP), unless specifically approved by the CPM.

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;

2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontologic sensitivity;

3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;

4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; 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 would 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 would include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report would address any issues or concerns about the project relating to paleontologic monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of the CPM-approved paleontological resource report (see Conditions of Certification **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to the CPM.

Certification of Completion
Worker Environmental Awareness Program
Carizzo Energy Solar Farm (07-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:___/___/__

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POWER PLANT EFFICIENCY

Erin Bright and Steve Baker

SUMMARY OF CONCLUSIONS

The Carrizo Energy Solar Farm (CESF), if constructed and operated as proposed, would generate 177 megawatts (MW) (maximum net output) of electricity. This project would consist of Compact Linear Fresnel Reflector (CLFR) solar concentrating lines developed by AUSRA, steam drums, steam turbine generators and air-cooled condensers (ACCs). The CESF would use solar energy to generate all of its capacity; no fossil fuel would be consumed in power production.

The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would create no adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume fossil fuel energy at all. No efficiency standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on fossil fuel energy resources.

The CESF, if constructed and operated as proposed, would occupy approximately 3.5 acres per MW of power output, a figure half that of some other solar power technologies.

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 Carrizo Energy Solar Farm (CESF), would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that the CESF'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. (The CESF, in fact, would

consume none.) 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, but a consensus is forthcoming (CEC 2008**XX**). 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. Even in a desert environment, disturbing and shading hundreds or thousands of acres of land can impact biological, cultural and paleontological resources, and can affect drainage, runoff and percolation of rainfall. The extent of these impacts is likely in direct proportion to the number of acres affected. For this reason, staff will evaluate 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 backed out by reducing the plant's net energy output by the amount of energy that could have been produced by consuming the project's annual gas consumption in a modern combined cycle power plant. (See **EFFICIENCY Appendix A**, immediately following.) This reduced energy output will then be divided by acres impacted.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

SETTING

The applicant proposes to build and operate the CESF, a solar thermal power plant facility producing a total of 177 MW (maximum net output) and employing AUSRA's Compact Linear Fresnel Reflector solar power technology. The project would consist of Compact Linear Fresnel Reflector (CLFR) solar concentrating lines developed by AUSRA, steam drums, two steam turbine generators and two air-cooled condensers (CESF 2007a, AFC §§1.1, 1.2.1, 3.1).

The project's power cycle would be based on a steam cycle (also known as the Rankine cycle) with two pressure stages (CESF 2007a, AFC § 3.4.3.3; Fig. 3.4-7). Steam is generated in the CLFRs, collected in the steam drums and expanded through the steam turbine to generate electricity. No intermediate fluid is used.

The solar field and power generation equipment are started each morning after sunrise once solar radiation builds up, and are shut down in the evening when solar radiation drops below the level required for keeping the steam turbines online. Residual heat in the steam system would be used to bring the system up to operating temperature in the morning and for freeze protection (CESF 2007a, AFC §§ 3.4.2, 3.4.3.2.2). The CESF would not consume natural gas, nor would it be connected to a supply of gas.

ASSESSMENT OF IMPACTS — FOSSIL FUEL ENERGY USE

METHOD AND THRESHOLD FOR DETERMINING THE SIGNIFICANCE OF FOSSIL FUEL ENERGY RESOURCES

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.

PROJECT ENERGY REQUIREMENTS AND ENERGY USE EFFICIENCY

The CESF would consume no natural gas or other fossil fuel for power generation. The chief use of fuel at the project site would be for maintenance vehicles. Therefore, staff considers the CESF would produce no impact on energy supplies.

ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES

The CESF would consume no natural gas or other fossil fuel. Therefore, the project would create no increase in natural gas demand.

ADDITIONAL ENERGY SUPPLY REQUIREMENTS

No natural gas fuel would be supplied to the project. The CESF would require no additional energy supply.

COMPLIANCE WITH ENERGY STANDARDS

No standards apply to the efficiency of the CESF or other non-cogeneration projects.

ALTERNATIVES TO REDUCE WASTEFUL, INEFFICIENT, AND UNNECESSARY ENERGY CONSUMPTION

The CESF could create significant adverse impacts on energy resources if alternatives were available 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. Because the project would consume no fuel, no alternatives exist that could reduce the project's fuel use.

Staff, therefore, believes that the CESF would not constitute a significant adverse impact on fossil fuel energy resources compared to feasible alternatives.

ASSESSMENT OF IMPACTS — SOLAR LAND USE

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, solar collector foundations and roads can disturb and destroy cultural and paleontological resources. Shading large tracts of land can destroy its use as habitat for flora and fauna. Finally, the earthwork involved in leveling large areas for optimum solar energy collection can disturb the drainage, runoff and percolation of rainfall.

As discussed above, Energy Commission staff is unaware of any accepted standard for evaluating the efficiency of a solar power plant such as the CESF. Accordingly, staff proposes to tabulate the land use efficiency of the project (described above) and compare it to similar measures for other solar power plant projects that have passed through, or are passing through, the Energy Commission's siting process.

METHOD AND THRESHOLD FOR DETERMINING THE SIGNIFICANCE OF SOLAR LAND USE ENERGY RESOURCES

Energy Commission staff proposes to compare the land use of a solar power plant project to that of other solar projects in the Energy Commission's siting process. It has not been determined how great a difference in land use would constitute a significant difference; staff proposes to compare the four solar projects currently in the process.

As this is written, there are currently four solar power plant projects in the Energy Commission siting process. 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

While the Energy Commission customarily requires full mitigation for such impacts, such mitigation is generally regarded as less effective in protecting resources than avoiding the impact entirely. A solar power project that occupies twice as much land as another project holds the potential to produce twice the environmental impacts.

PROJECT LAND USE

The CESF would produce power at the rate of 177 MW net, and would generate energy at the rate of 375,000 MW-hours net per year, while occupying 640 acres (CESF 2007a, AFC §§ 1.1, 1.2, 3.4.1.4). It would consume no natural gas. Staff calculates power-based land use efficiency thus:

Power-based efficiency: 177 MW ÷ 640 acres = **0.28 MW/acre** or **3.6 acres/MW**

Staff calculates energy-based land use efficiency thus:

Energy-based efficiency: 375,000 MWh/year ÷ 640 acres = 5**86 MWh/acre-year**

As seen in **EFFICIENCY Table 1**, the CESF, employing AUSRA CLFR technology, is roughly twice as efficient in use of land as the Ivanpah SEGS project, which employs BrightSource power tower technology, and the Stirling Energy Systems Solar Two project; and is roughly equivalent in use of land to the Beacon Solar Energy project, which employs linear parabolic trough technology.

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.

EFFICIENCY Table 1 — Solar Land Use Efficiency

Project	Generating Capacity (MW net)	Annual Energy Production (MWh net)	Annual Fuel Consumption (MMBtu LHV)	Footprint (Acres)	Land Use Efficiency (Power-Based) (MW/acre)	Land Use Efficiency (Energy – Based) (MWh/acre-year)	
						Total	Solar Only[1]
Carrizo Energy (07-AFC-8)	177	375,000	0	640	0.28	586	586
Ivanpah SEGS (07-AFC-5)	400	960,000	432,432	3,744	0.11	256	238
Beacon Solar (08-AFC-2)	250	600,000	32,432	1,240	0.20	484	480
SES Solar Two (08-AFC-5)	750	1,620,000	0	6,500	0.12	249	249
Avenal Energy (08-AFC-1)[2]	600	3,023,388	24,792,786	25	24.0	120,936	N/A

[1] Net energy output is reduced by natural gas-fired combined cycle proxy energy output; see **EFFICIENCY Appendix A**.

[2] Example natural gas-fired combined cycle plant.

Building a solar power plant employing a different technology, such as the BrightSource power tower technology of the Ivanpah SEGS project or the Stirling Engine technology of the SES Solar Two project, would halve the solar land use efficiency of the CESF. This would likely double the land use-based environmental impacts brought about by the project. Staff believes the CESF represents the most land use-efficient solar technology currently available.

Alternative Heat Rejection System

The applicant proposes to employ a dry cooling system (air-cooled condensers) as the means for rejecting power cycle heat from the steam turbines (CESF 2007a, AFC §§ 1.1, 1.2.1, 3.1, 3.4.6). An alternative heat rejection system would utilize evaporative cooling towers.

The local climate in the project area is characterized by high temperatures and low relative humidity (low wet-bulb temperature). In low temperatures and high relative humidity (low dry-bulb temperature), the air-cooled condenser performs relatively efficiently compared to the evaporative tower. However, at the project area (low wet-bulb temperature and high dry-bulb temperature) the air-cooled condenser performance is relatively poor compared to that of an evaporative cooling tower. Furthermore, the performance of the heat rejection system affects the performance of the steam turbine, impacting turbine efficiency. However, to conserve water in the project site's desert environment, the applicant proposes to employ dry cooling. Even though evaporative cooling could offer greater efficiency, staff believes the applicant's selection of dry cooling is a reasonable tradeoff as it would prevent potentially significant environmental impacts that could result from consumption of the large quantities of water required by wet cooling.

CUMULATIVE IMPACTS

There are no nearby power plant projects that hold the potential for cumulative energy consumption impacts when aggregated with the project. The proposed 550 MW OptiSolar photovoltaic solar farm, to be located north of the CESF, could result in cumulative land use impacts.

Staff believes that the construction and operation of the project would not create indirect impacts (in the form of additional fuel consumption) that would not have otherwise occurred without this project. Because the CESF would consume no natural gas, it should compete favorably in the California power market and replace fossil fuel burning power plants. The project would therefore cause a positive impact on the cumulative amount of natural gas consumed for power generation.

NOTEWORTHY PUBLIC BENEFITS

The CESF 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.

CONCLUSIONS AND RECOMMENDATIONS

FOSSIL FUEL ENERGY USE

The CESF, if constructed and operated as proposed, would use solar energy to generate all of its capacity, consuming no natural gas. 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

The CESF, if constructed and operated as proposed, would occupy less than four acres per MW of power output, a figure half that of some other solar power technologies. Employing a more land-intensive solar technology, such as the BrightSource power tower technology or linear parabolic trough technology, would double these impacts. Staff believes the CESF represents the most land use-efficient solar technology currently available.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

CESF2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

CEC 2008**XX** – Report of Conversation between Steve Baker and Golam Kibrya – CEC staff. February 22, 2008.

EFFICIENCY Appendix A

Solar Power Plant Efficiency Calculation
Gas-Fired Proxy

In calculating the efficiency of a solar power plant, it is desired to subtract the effect of natural gas burned for morning startup, cloudy weather augmentation and Therminol freeze protection. As a proxy, we will use an average efficiency based on several recent baseload combined cycle power plant projects in the Energy Commission siting process. Baseload combined cycles were chosen because their intended dispatch most nearly mirrors the intended dispatch of solar plants, that is, operate at full load in a position high on the dispatch authority's loading order.

The most recent such projects are:

Colusa Generating Station (06-AFC-9)
- Nominal 660 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
- Air cooled condenser, evaporative inlet air cooling
- Efficiency with duct burners on: 666.3 MW @ 52.5% LHV
- Efficiency with duct burners off: 519.4 MW @ 55.3% LHV
- Efficiency (average of these two): **53.9% LHV**

San Gabriel Generating Station (07-AFC-2)
- Nominal 696 MW 2-on-1 Combined Cycle with Siemens 5000F CGTs
- Air cooled condenser, evaporative inlet air cooling
- Efficiency with duct burners on: 695.8 MW @ 52.1% LHV
- Efficiency with duct burners off: 556.9 MW @ 55.1% LHV
- Efficiency (average of these two): **53.6% LHV**

KRCD Community Power Plant (07-AFC-7)
- Nominal 565 MW 2-on-1 Combined Cycle with GE or Siemens F-class CGTs
- Evaporative cooling, evaporative or fogging inlet air cooling
- Efficiency with GE CGTs: 497 MW @ 54.6% LHV
- Efficiency with Siemens CGTs: 565 MW @ 56.1% LHV
- Efficiency (average of these two): **55.4% LHV**

Avenal Energy (08-AFC-1)
- Nominal 600 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
- Air cooled condenser, inlet air chillers
- Efficiency with duct burners on: 600.0 MW @ 50.5% LHV
- Efficiency with duct burners off: 506.5 MW @ 53.4% LHV
- Efficiency (average of these two): **52.0% LHV**

Average of these four power plants: **53.7% LHV**

POWER PLANT RELIABILITY

Erin Bright and Steve Baker

SUMMARY OF CONCLUSIONS

The applicant predicts an equivalent availability factor of 95 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 Carrizo Energy Solar Farm (CESF) would be built and would operate in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No conditions of certification are proposed.

INTRODUCTION

In this analysis, California Energy Commission (Energy Commission) staff addresses the reliability issues of the CESF 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 95 percent for the CESF (see below), staff uses typical industry norms as the benchmark, rather than the applicant’s projection, to evaluate the project’s reliability.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, or standards (LORS) apply to the reliability of this project.

SETTING

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state’s control area operators, such as the California 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. According to the AFC, the CESF has negotiated a power purchase agreement with a major California utility company (company’s name not disclosed in the AFC) (CESF 2007a, AFC § 2.0).

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 177-megawatt (MW) (net power output) CESF, 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) (CESF 2007a, AFC §§ 1.1, 1.2, 2.1, 2.2). 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 95 percent. The project is anticipated to normally operate in the neighborhood of 3,000 hours per year, at an annual capacity factor of approximately 24 percent (CESF 2007a, AFC §§ 3.4.14, 3.7.1).

ASSESSMENT OF IMPACTS

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 CESF is expected to operate reliably (CESF 2007a, AFC § 3.7.1). 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 CESF would be as reliable as other power plants on the electric system and would not degrade system reliability.

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 (CESF 2007a, AFC §§ 3.7.1, 3.7.4) 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. This redundancy would allow service or repair to be done during sunny days when the plant is in operation, if required.

The applicant plans to provide an appropriate redundancy of function for the project (CESF 2007a, AFC §§ 3.4.2, 3.7.2; Table 3.7-1). Because the project incorporates two independent steam turbine generators, it is inherently reliable. A single equipment failure could not disable more than one generating unit, which would allow the other unit to continue to generate at full output. Nearly 200 solar collectors channel steam to 20 steam drums, which then direct it to two larger steam drums, one per steam turbine. All other major plant systems are also designed with adequate redundancy to ensure their continued operation if equipment fails. Staff believes that this project's proposed equipment redundancy would be sufficient for its reliable operation.

Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products, and the applicant would base the project's maintenance program on those recommendations (CESF 2007a, AFC § 3.7.1). 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 CESF would consume no natural gas or other fossil fuel for power generation; the sole consumption of fossil fuel would be to power maintenance vehicles. Consequently, the project will not be connected to any natural gas pipelines (CESF 2007a, AFC § 1.2.1). The CESF therefore would not rely on gas supplies.

Water Supply Reliability

The CESF would use well water for domestic and industrial water needs, including steam cycle makeup, mirror washing, service water and fire protection water. An existing groundwater well on the project site would provide raw water; a skid-mounted water treatment plant would provide potable water (CESF 2007a, AFC §§ 1.2.1, 1.2.2, 3.4.5, 3.7.3). Raw water and fire water would be stored in a 450,000 gallon tank, demineralized water for steam cycle makeup in a 40,000 gallon tank, and potable water in a 500 gallon tank (CESF 2007a, AFC §§ 1.2.1, 1.2.2, 3.4.10.7.3) To minimize water use, air-cooled condensers would be employed to cool spent steam from the steam

turbine generators. Staff believes these sources represent a reliable supply of water for the project. For further discussion of water supply, see the **Soil and Water Resources** section of this document.

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), flooding, high winds and blowing dust could present credible threats to the project's reliable operation (CESF 2007a, AFC § 3.5.1).

Seismic Shaking

The site lies within Seismic Zone 4 (CESF 2007a, AFC § 3.5.1.1); see the "Faulting and Seismicity" portion of the **Geology and Paleontology** section of this document. The project will be designed and constructed to the latest applicable LORS (CESF 2007a, AFC Appendices D, E). Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it would be built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see the section of this document entitled **Facility Design**. In light of the general historical performance of California power plants and the electrical system in seismic events, staff has no special concerns with the power plant's functional reliability during earthquakes.

Flooding

A small portion of the site lies within the 100-year flood plain (CESF 2007a, AFC § 3.5.1.2). Project features will be designed to provide adequate levels of flood resistance. Staff believes there are no special concerns with power plant functional reliability due to flooding. For further discussion, see **Soil and Water Resources** and **Geology and Paleontology**.

Wind and Dust

Frequent strong winds, and dust entrained with them, are a feature of the environment at the CESF site. All buildings and structures would be designed and constructed to the latest editions of the California Building Code and the San Luis Obispo County Building Code. This should provide adequate protection from damage due to wind or dust.

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 solar technology is relatively new, no statistics are available for solar power plants. The project's power cycle is based on the well-known Rankine steam cycle. Because natural gas is the primary type of fossil fuel used in California, staff finds it reasonable to compare the project's availability factor to

the average availability factor of natural gas-fired fossil fuel units. Also, because the project's total net power output would be 177 MW, staff uses the NERC statistics for 100–199 MW units. The NERC reported an availability factor of 86.93 percent as the generating unit average for the years 2002 through 2006 for natural gas units of 100–199 MW (NERC 2007).

The AUSRA Compact Linear Fresnel Reflector technology is not entirely new. The first CLFR plant was built in New South Wales, Australia, and was a success. The second CLFR plant was built at the same location, and should be operational as this is written (CESF 2007a, AFC § 3.4.3.2). Staff believes that the CLFR technology is likely to exhibit the projected reliability.

The project would use two-pressure condensing steam turbine technology. Steam turbines incorporating this technology have been on the market for many years now and are expected to exhibit typically high availability. Also, because solar-generated steam is cleaner than burnt fossil fuel (i.e., natural gas), the CESF 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 95 percent (CESF 2007a, AFC §§ 3.4.14, 3.7.1) 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, because the plant would consist of two independent steam turbine generators, maintenance could be scheduled during times of the year when the full power output is not required to meet market demand, which is typical of industry standard maintenance procedures.

The applicant's estimate of plant availability, therefore, appears to be realistic. Stated procedures for assuring the design, procurement, and construction of a reliable power plant appear to be consistent with industry norms, and staff believes they are likely to ultimately produce an adequately reliable plant.

NOTEWORTHY PROJECT BENEFITS

This project would help serve the need for renewable energy in California, as all of the electricity generated would be produced by a reliable source of energy that is available during the hot summer afternoons, when power is needed most.

CONCLUSION

The applicant predicts an equivalent availability factor of 95 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. This should provide an adequate level of reliability. No conditions of certification are proposed.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

CESF2007a – Carrizo, LLC/P. Fontana (tn: 43007) Submittal of the Application for Certification for the Carrizo Energy Solar Farm Project. Dated October 2007. Submitted to CEC/B.B. Blevins/M Dyas/Dockets on 10/25/2007.

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TRANSMISSION SYSTEM ENGINEERING

Sudath Arachchige and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed Carrizo Energy Solar Farm (CESF) Project's outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS). The analysis of environmental impacts for project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project have been evaluated by staff and are included in the environmental sections of this staff assessment.

The following transmission facilities are required to interconnect the project to the California Independent System Operator (California ISO) controlled grid:

- The construction of approximately 850 feet of 230kV two single circuits with 500MCM, Aluminum Conductor Steel-Reinforced (ACSR) conductors, from the project switchyard to the new PG&E looping switching station, all within the CESF site. The construction of the 230kV line would require two dead end structures and five 230kV, 115 foot tall steel poles.
- The construction of the New-Loop-in 230kV Switching station adjacent to the northern boundary of the project, and within the project site.
- The Morro Bay-Midway 230kV #1 transmission line would interconnect the project to PG&E grid by loop in and out from the newly built 230kV switching station and would require approximately 90 feet of 230kV transmission line outside the project boundary for each of the two looping circuits.
- A detailed special protection system (SPS) study is required in the facility study to determine the mitigation plan for N-2 overloads. The inclusion of CESF project in the existing SPS would occur within the fence line of the existing substations and would not trigger CEQA review.

INTRODUCTION

STAFF ANALYSIS

This transmission system engineering (TSE) analysis examines whether this project's proposed interconnection conforms to all LORS required for safe and reliable electric power transmission. Additionally, under CEQA, the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (Title 14, California Code of Regulations §15378). The Energy Commission must therefore identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and that represent the whole of the action.

Commission staff relies upon the responsible interconnecting authority for analysis of impacts on the transmission grid, as well as for the identification and approval of new or

modified facilities required downstream from the proposed interconnection for mitigation purposes. The proposed project would connect to PG&E's 230-kV transmission network and requires both analysis by PG&E and the approval of the California ISO.

PG&E'S ROLE

PG&E is responsible for ensuring electric system reliability in its service territory for proposed transmission modifications. For the CESF project and at the request of the CA ISO, PG&E performed the System Impact Study (SIS) used to determine whether or not the proposed transmission modifications conform to reliability standards. Because the project would be connected to the California ISO controlled transmission grid, the California ISO's role is to review and approve the SIS and its conclusions.

CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and is also responsible for developing the standards necessary to achieve system reliability. The project power will be dispatched to the California ISO grid via PG&E's Morro Bay-Midway 230kV #1 transmission line, which would loop in and out through the 230kV new Loop-In-Switching station. Therefore, California ISO conducts the studies of the PG&E system to ensure adequacy of the proposed transmission interconnection. The California ISO determines the reliability impacts of the proposed transmission modifications on the PG&E transmission system in accordance with all applicable reliability criteria. According to the California ISO tariffs, the California ISO will determine the "need" for transmission additions or upgrades downstream from the interconnection point to insure reliability of the transmission grid. On completion of the PG&E Facility Study, the California ISO will review the study results, provide its conclusions and recommendations, and issue a final approval/disapproval letter for the interconnection of the proposed CESF project. The California ISO may provide written and verbal testimony on its findings at the Energy Commission hearings.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), *Rules for* Overhead *Electric Line Construction*, sets forth uniform requirements for the construction of overhead lines. Compliance with this order ensures both adequate service and the safety of both the public and the people who build, maintain, and operate overhead electric lines.
- CPUC General Order 128 (GO-128), *Rules for Construction of Underground* Electric Supply *and Communications Systems*, sets forth uniform requirements and minimum standards for underground supply systems to ensure adequate service and the safety of both the public and the people who build, maintain, and operate underground electric lines.
- The National Electric Safety Code, 1999, provides electrical, mechanical, civil, and structural requirements for overhead electric line construction and operation.
- The combined NERC/WECC (North American Electric Reliability Corporation/Western Electricity Coordinating Council) planning standards provide

system performance standards for assessing the reliability of the interconnected transmission system. These standards require continuity of service as their first priority and the preservation of interconnected operation as their second. Some aspects of NERC/WECC standards are either more stringent or more specific than the either agency's standards alone. These standards are designed to ensure that transmission systems can withstand both forced and maintenance outage system contingencies while operating reliably within equipment and electric system thermal, voltage, and stability limits. These standards include reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of WECC standards, *NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table,* and on Section I.D, *NERC and WECC Standards for Voltage Support and Reactive Power.* These standards require that power flows and stability simulations verify defined performance levels. Performance levels are defined by specifying allowable variations in thermal loading, voltage and frequency, and loss of load that may occur during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (such as the loss of load from a single transmission element) to a catastrophic loss level designed to prevent system cascading and the subsequent blackout of islanded areas and millions of consumers during a major transmission disturbance (such as the loss of multiple 500-kV lines along a common right-of- way, and/or of multiple large generators). While the controlled loss of generation or system separation is permitted under certain specific circumstances, this sort of major uncontrolled loss is not permitted (WECC, 2002).

- NERC's reliability standards for North America's electric transmission system spell out the national policies, standards, principles, and guidelines that ensure the adequacy and security of the nation's transmission system. These reliability standards provide for system performance levels under both normal and contingency conditions. While these standards are similar to the combined NERC/WECC standards, certain aspects of the combined standards are either more stringent or more specific than the NERC performance standards alone. NERC's reliability standards apply to both interconnected system operations and to individual service areas (NERC, 2006).
- California ISO planning standards also provide the standards and guidelines that ensure the adequacy, security, and reliability of the state's member grid facilities. These standards also incorporate the combined NERC/WECC and NERC standards. These standards are also similar to the NERC/WECC or NERC standards for transmission system contingency performance. However, the California ISO standards also provide additional requirements that are not found in either the WECC/NERC or NERC standards. The California ISO standards apply to all participating transmission owners interconnecting to the California ISO- controlled grid. They also apply to non-member facilities that impact the California ISO grid through their interconnections with adjacent control grids (California ISO, 2002a).
- California ISO/FERC (Federal Energy Regulatory Commission) electricity tariffs contain guidelines for building all transmission additions/upgrades within the California ISO-controlled grid. (California ISO, 2003a).

PROJECT DESCRIPTION

The applicant proposes to interconnect the 186 megawatt (MW) CESF project to PG&E's 230 kV Midway substation in San Luis Obispo County, California. The CESF project would utilize the solar thermal technology with two 98.6 MW steam turbine generators with a maximum net output of 186 MW. The generator auxiliary load would be 4 MW, resulting in a maximum net output of 186 MW at an 85 percent power factor. Each steam generating unit would be connected to the low side of its dedicated 13.8/230kV and 69/FA/115 megavolt ampere (MVA) generator step-up (GSU) transformer through 5,000-ampere gas-insulated (SF6) breakers. The high side of each generator step-up transformer would be connected to the project's four breaker ring bus 230 kV CESF Switchyard by 500MCM ACSR per phase over head conductors.

The first phase of the project (steam turbine #1) would begin commercial operation with an initial generating capacity of 30MW by May 2010 and fully generating capacity of 98.6MW by December 2010. The second phase of the project (steam turbine #2) would begin commercial operation with an initial generating capacity of 30MW by December 2010 and fully generating capacity of 98.6MW by December 2011. The plant will gain the fully operational capacity of 186 MW by December 2011.

The CESF 230kV switchyard will be interconnected to the New-Loop-In 230kV Switching Station via newly proposed two 230kV overhead single circuits. The proposed overhead line begins at the dead-end structure in the switchyard and continues east along the northern edge of the project site for 700 feet, and then turns north for 150 feet to interconnect the plant to the existing PG&E Morro Bay-Midway 230kV #1 transmission line at the New- Loop-In 230kV switching station. The 850 feet long, 230kV single circuits would be built with 500MCM per phase ACSR conductors. The construction of the 230kV line would require two dead end structures in the switchyard and five 230kV, 115 foot tall steel poles along the right-of-way of the project site. (CESF, 2007b section 3.4 pages 3-26 to 3-27 and Figure 3.4-14 and 3.4-16)

SWITCHYARD AND INTERCONNECTION FACILITIES

The CESF switchyard will be interconnected to a newly built Loop-In 230kV Switching Station by the proposed overhead generator tie line which is rated to carry full capacity of the CESF project. The 850 feet long, 230kV two single circuits (generator-tie lines) would be built with 500MCM per phase ACSR conductors. The project's CESF switchyard would use ring bus configuration with four 230-kV circuit breakers, disconnect switches, and other switching gear that will allow delivery of the project's output to the New-Loop- In 230kV switching station.

The new Loop-In 230kV Switching Station would build with double bus, breaker and a half configuration and utilize two bays and three line positions. The proposed 230kV Loop-In-Switching Station would construct with 230-kV 1200 Ampere six circuit breakers and disconnects switches. The Morro Bay-Midway 230kV #1 transmission line would interconnect the project to PG&E grid by loop in and out from the newly built 230kV switching station and would require approximately 90 feet of 230kV transmission line outside the project boundary for each of the two looping circuits. (CESF, 2007b section 3.4 pages 3-26 to 3-27 and Figure 3.4-14 and 3.4-16)

Assessment of Impacts and discussion of mitigation

For the interconnection of this proposed project to the grid, the interconnecting utility (PG&E) and the control area operator (California ISO) are responsible for ensuring grid reliability. These two entities determine the transmission system impacts of the proposed project and any mitigation measures needed to ensure system conformance with utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. System impact and facilities studies are used to determine the impacts of the proposed project on the transmission grid. Staff relies on these studies and any review conducted by the California ISO to determine the effect of the project on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards. System impact and facilities studies analyze the grid both with and without the proposed project, under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined. The studies analyze the impact of the project for the proposed first year of operation, and are based on a forecast of loads, generation, and transmission. Load forecasts are developed by the interconnected utility. Generation and transmission forecasts are established by an interconnection queue. The studies focus on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads, or cascading outages), and short circuit duties. If the studies show that the interconnection of the project causes the grid to be out of compliance with reliability standards, then the study will identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. When a project connects to the California ISO-controlled grid, both the studies and mitigation alternatives must be reviewed and approved by the California ISO. If either the California ISO or interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions requiring CEQA review, the Energy Commission must analyze those modifications or additions according to CEQA requirements.

SCOPE OF SYSTEM IMPACT STUDY

The system impact study was performed by PG&E at the request of Ausra CA II, LLC (dba Carrizo Energy, LLC) and the California ISO to identify the transmission system impacts of CESF on PG&E's 115/230/500-kV system. The study included power flow, sensitivity, and short circuit studies, and transient and post-transient analyses (CESF, 2007a, system impact study). The study modeled the proposed project for a net output of 186 MW. The base case was developed from PG&E's 2007 base case series and has a 1-in-10 year extreme weather load for the Central Coast and Los Padres Areas. The base cases included all California ISO-approved major PG&E transmission projects, and model all proposed higher-queued generation projects that will be operational by 2012.The detailed study assumptions are described in the study. The power flow studies were conducted with and without CESF connected to PG&E's grid at the Midway Substation, using 2012 heavy summer and 2012 light spring base cases. The power flow study assessed the project's impact on thermal loading of the transmission lines and equipment. Additionally, two sensitivity studies were conducted to determine system impacts if certain generation projects were not constructed under 2012 heavy Summer conditions. Transient and post-transient studies were conducted

for Midway using the 2012 heavy summer base case to determine whether the project would create instability in the system following certain selected outages. Short circuit studies were conducted to determine if CESF would overstress existing substation facilities.

While the following analysis discusses all results of the SIS, staff believes the results of the sensitivity without the Morro Bay Modernization project provides the best forecast of the CESF impacts on the transmission system. The base case analysis in the SIS included the 1,200 MW Morro Bay Modernization project (MBM) because the MBM had a higher queue position in the California ISO generation interconnection queue than the CESF. As of September 20, 2008, the Morro Bay modernization project has been withdrawn from the California ISO generation queue making the sensitivity study without the MBM the more applicable study. The MBM project would need to reapply and restart the California ISO Large Generator Interconnection Process in order to connect to the California ISO controlled grid. Hence, Staff has selected Morro Bay Modernization project sensitivity study results to determine the pre and post project criteria violations.

Power Flow Study Results

This section summarizes the results of the SIS for the CESF. Staff has summarized the important results of the entire study, including the Base Case analysis and the two sensitivity cases. Since the Morro Bay modernization project has been withdrawn from the California ISO generation queue staff believes the sensitivity study without the MBM is the most applicable study.

The system impact study identified pre-project overload criteria violations under the 2012 heavy summer and 2012 light spring conditions. Pre-project overloads are caused by either existing system conditions or by projects with higher positions in the California ISO's generator interconnection queue. There are no normal overloads caused by the post-project condition other than the one pre-project overload exacerbated by the project. However, there are emergency overloads caused by the post-project under the N-1 and N-2 system condition.

Base Case Study results and mitigation measures (including MBM project):

- The study has not identified any N-0 overloads or voltage violations caused by the project.
- Under heavy summer conditions, the project causes one new overload and exacerbates seven pre-project N-1 emergency overloads. The SIS has identified mitigation measures for N-1 system conditions.

  Overload: CESF project causes new overloads on the Carrizo Plan Project (Q194)-Midway 230kV line under 2012 heavy summer system conditions.

  - Mitigation: Reconductor the Carrizo Plain project-Midway section of the Morro Bay-Midway #1 230kV line (34 miles) with a conductor with a rating of 1700 Ampere or greater would mitigate the overloads caused by the project. The substation terminal equipment would require upgrading to match or exceed the ampere rating of the new conductor.

- Under heavy summer conditions, the project causes three new overloads and exacerbates twelve pre-project N-2 emergency overloads. The mitigation measures for N-2 emergency overloads would be selected in the Facility Study.

The overloads for N-2 post-project system contingencies would be mitigated by load shedding or generation dropping of the system. PG&E or California ISO or both would require coordinating new generators for generation dropping scheme or load shedding and bear the responsibilities of the cost of the operating procedures and /or Special Protection Systems (SPS). The Facility Study will provide the cost estimates and work scope for interconnection facilities and the transmission network upgrades.

Power Flow Sensitivity Study and Results

Morro Bay Modernization Project Sensitivity Study (Excluding MBM project)

The sensitivity power flow analysis was done assuming that the Morro Bay Modernization Project is not constructed under 2012 Heavy Summer conditions, thereby reducing 1,200 MW queue generation in the study assumptions. Staff believes the results of this sensitivity study represent the best available forecast of the impacts of the CESF on the California ISO transmission system.

Study results reveal that the project causes no new normal overloads and exacerbates one pre-project normal overload under 2012 Heavy summer conditions. Additionally, under the N-1 contingency analysis the project causes no new overloads and exacerbates two pre-project N-1 overloads under 2012 heavy summer conditions. Therefore, the power flow study indicates that no new N-0 or N-1 mitigation is required due to the project.

California Valley PV Project Sensitivity Study (Excluding MBM project)

The Morro Bay modernization project has been withdrawn from the California ISO generation queue making the sensitivity study without the MBM the more applicable study. Therefore, the emergency overloads identified in the California Valley PV project sensitivity study and the proposed mitigation measures while informative are not expected impacts of the CESF.

The sensitivity power flow analysis was done without the California Valley PV project under 2012 Heavy Summer Conditions, thereby reducing 210 MW queue generation in the study assumptions.

Study results reveal that the project causes no new normal overloads and exacerbates one pre-project normal overload under 2012 Heavy summer conditions. Under the N-1 contingency analysis, there are two new overloads caused by the post-project and exacerbates five pre-project N-1 overloads under the 2012 Heavy Summer conditions.

- Overload: CESF project will cause new post-project overloads on the Morro Bay-Gates 230kV line under the sensitivity study.
    - Mitigation: The proposed mitigation is to reconductor the Morro Bay-Gates #2 230kV line (69 miles) with a conductor capable of an emergency rating of 1500 Amps or greater. The substation terminal equipments should be upgraded to match or exceed the ampere rating of the new conductors.

- Overload: CESF project will cause new post-project overloads on the Carrizo Plain project-Midway #1 230kV line under the sensitivity study.
    - Mitigation: The proposed mitigation is to reconductor the Carrizo Plain project-Midway section of the Morro bay-Midway #1 230kV line (34 miles) with a conductor capable of an emergency rating of 1700 Amps or greater. The substation terminal equipments should be upgraded to match or exceed the ampere rating of the new conductors.

Transient and Post-Transient Power Flow Study Results

NERC/WECC planning standards require that the system maintain post-transient voltage stability when either critical path transfers or area loads increase by 5 percent for category ”B” contingencies, and 2.5 percent for category ”C” contingencies. Post-transient studies conducted for similar or larger generators in the area concluded that voltage remains stable under both N-1 and N-2 contingencies. The transient and post-transient study results indicate that the project would have no adverse impact on the stable operation of the transmission system.

Short Circuit Study Results

Short circuit studies were performed to determine the degree to which the addition of CESF project increases fault duties at PG&E’s substations, adjacent utility substations, and the other 115-kV, 230-kV, and 500-kV busses within the study area. The busses at which faults were simulated, the maximum three-phase and single-line-to-ground fault currents at these busses both with and without the project, and information on the breaker duties at each location are summarized in the tables (8.1 Short Circuit study results) of the System Impact Study Report (CESF, 2006b, SIS tables on p. 15). The SIS indicates that the project did not trigger any circuit breaker upgrades.

COMPLIANCE WITH LORS

The study indicates that the project interconnection would comply with NERC/WECC planning standards and California ISO reliability criteria. The applicant will design, build, and operate the proposed 230kV CESF switchyard, the new loop in 230kV switching station and the 230-kV overhead transmission lines. Staff concludes that, assuming the proposed conditions of certification are met, the project would likely meet the requirements and standards of all applicable LORS.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments related to the TSE discipline have been received.

CONCLUSIONS AND RECOMMENDATIONS

The proposed Carrizo Energy Solar Farm (CESF) Project’s outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS). The analysis of environmental impacts for project transmission lines and equipment, both from the power plant up to the point of interconnection with the

existing transmission network as well as upgrades beyond the interconnection that are attributable to the project have been evaluated by staff and are included in the environmental sections of this staff assessment.

The following additional new transmission facilities are required to interconnect the project to the California Independent System Operator (California ISO) grid:

- The construction of approximately 850 feet of 230kV two single circuits with 500MCM, Aluminum Conductor Steel- Reinforced (ACSR) conductors, along the project right-of-way (ROW) from the project switchyard to the Carrizo new looping switching station. The construction of the 230kV line would require two dead end structures and five 230kV, 115 foot tall steel poles.
- The construction of the New-Loop-in 230kV Switching station adjacent to the northern boundary of the project, and within the project site.
- The Morro Bay-Midway 230kV #1 transmission line would interconnect the project to PG&E grid by loop in and out from the newly built 230kV switching station and would require approximately 90 feet of 230kV transmission line outside the project boundary for each of the two looping circuits.
- A detailed special protection system (SPS) study is required in the facility study to determine the mitigation plan for N-2 overloads. The inclusion of CESF project in the existing SPS would occur within the fence line of the existing substations and would not trigger CEQA review.

RECOMMENDATIONS

If the Energy Commission approves this project, staff recommends that the following conditions of certification be met to ensure both system reliability and conformance with LORS.

CONDITIONS OF CERTIFICATION FOR TSE

TSE-1 The project owner shall furnish to the Compliance Project Manager (CPM) and to the Chief Building Official (CBO) a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.

Verification: At least 60 days prior to the start of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Table 1: Major Equipment List** below). Additions and deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

TRANSMISSION SYSTEM ENGINEERING Table 1
Major Equipment List

Breakers
Step-Up Transformer
Switchyard
Busses
Surge Arrestors
Disconnects
Take Off Facilities
Electrical Control Building
Switchyard Control Building
Transmission Pole/Tower
Grounding System

TSE-2 Prior to the start of construction, the project owner shall assign an electrical engineer and at least one of each of the following to the project: A) a civil engineer; B) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; C) a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or D) a mechanical engineer. (Business and Professions Code Sections 6704 et seq. require state registration to practice as a civil engineer or structural engineer in California.

Protocol: The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California-registered electrical engineer. The civil, geotechnical or civil, and design engineer assigned in conformance with Facility Design condition **GEN-5**, may be responsible for design and review of the TSE facilities.

Protocol: The project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations.

Protocol: The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days prior to the start of rough grading (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (California Building Code, 1998, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action required obtaining the CBO's approval.

TSE-4 For the power plant switchyard, outlet line, and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. The number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: At least 30 days prior to the start of each increment of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval the final design plans,

specifications, and calculations for equipment and systems of the power plant switchyard, outlet line, and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

TSE-5 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations as determined by the CBO.

1. The CESF project will be interconnected to the PG&E grid via a 230-kV, 500MCM-ACSR per phase, approximately 850 feet long two single circuits (generator- tie lines). The proposed CESF switchyard would use a ring bus configuration with four 230kV breakers. The new Looping station would construct with double bus, breaker- and- a- half configuration with 2- bays and 4 positions. The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 and General Order 98 or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations (Title 8), Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders", California ISO standards, National Electric Code (NEC), and related industry standards.

2. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

3. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

4. The project conductors shall be sized to accommodate the full output from the project.

5. Termination facilities shall comply with applicable PG&E interconnection standards.

6. The project owner shall provide to the CPM:

   a. The final Detailed Facility Study (DFS) including a description of facility upgrades, operational mitigation measures, and/or Special Protection System (SPS) sequencing and timing if applicable,

   b. Executed project owner and California ISO Facility Interconnection Agreement.

Verification: At least 60 days prior to the start of construction of transmission facilities (or a lessor number of days mutually agree to by the project owner and CBO), the project owner shall submit to the CBO for approval:

1. Design drawings, specifications, and calculations conforming with CPUC General Order 95 and General Order 98 or NESC; Title 8, California Code of Regulations, Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders"; NEC; applicable interconnection standards, and related industry standards for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment.

2. For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst-case conditions,"[1] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; NEC; applicable interconnection standards, and related industry standards.

3. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements **TSE-5** 1) through 5) above.

4. The final Detailed Facility Study, including a description of facility upgrades, operational mitigation measures, and/or SPS sequencing and timing if applicable, shall be provided concurrently to the CPM.

TSE-6 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. A report of the conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-7 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC; Title 8, CCR, Articles 35, 36 and 37 of the "High Voltage Electric

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

Safety Orders"; applicable interconnection standards; NEC; and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

1. "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; applicable interconnection standards; NEC; and related industry standards, and these conditions shall be provided concurrently.

2. An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "Compliance Monitoring Plan."

3. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge

REFERENCES

California ISO (California Independent System Operator). 1998a. Cal-ISO Tariff Scheduling Protocol. Posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator). 1998b. Cal-ISO Dispatch Protocol. Posted April 1998.

California ISO (California Independent System Operator). 2002a. Cal-ISO Grid Planning Standards. February 2002.

CESF (Carrizo Plain Solar Power Project). 2006a. Ausra CA II, LLC, Carrizo Plain Solar Power Project (System Impact Study) submitted to the California Energy Commission.

CESF (Carrizo Plain Solar Power Project). 2007b. Ausra CA II, LLC, Carrizo Plain Solar Power Project Application for Certification. Submitted to the California Energy Commission.

NERC/WECC (North American Reliability Council/Western Electricity Coordinating Council). 2002. NERC/WECC Planning Standards. August 2002.

DEFINITION OF TERMS

AAC - All aluminum conductor

ACSR - Aluminum conductor steel-reinforced

ACSS - Aluminum conductor steel-supported

Ampacity - Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.

Ampere - The unit of current flowing in a conductor.

Bundled - Two wires, 18 inches apart.

Bus - Conductors that serve as a common connection for two or more circuits.

Conductor - The part of the transmission line (the wire) that carries the current.

Congestion management – A scheduling protocol, which provides that dispatched generation and transmission loading (imports) will not violate criteria.

Emergency overload – See “Single Contingency.” This is also called an L-1.

Kcmil or KCM – Thousand circular mil. A unit of the conductor’s cross sectional area When divided by 1,273, the area in square inches is obtained.

Kilovolt (kV) - A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.

Loop - An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection, and returns it back to the interrupted circuit, thus forming a loop or cul de sac.

Megavar - One megavolt ampere reactive.

Megavars - Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.

Megavolt ampere (MVA) – A unit of apparent power. It equals the product of the line voltage in kilovolts, current in amperes, and the square root of 3, divided by 1,000.

Megawatt (MW) – A unit of power equivalent to 1,341 horsepower.

Normal operation/normal overload – The condition arrived at when all customers receive the power they are entitled to, without interruption and at steady voltage, and with no element of the transmission system loaded beyond its continuous rating.

N-1 condition – See “single contingency.”

Outlet - Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.

Power flow analysis – A forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels.

Reactive power – Generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.

Remedial action scheme (RAS) – An automatic control provision, which, for instance, will trip a selected generating unit upon a circuit overload.

SF6 (sulfur hexafluoride) – An insulating medium.

Single contingency – Also known as “emergency” or “N-1 condition,” the occurrence when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.

Solid dielectric cable – Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

Switchyard - An integral part of a power plant and used as an outlet for one or more electric generators.

Thermal rating – See “ampacity.”

TSE - Transmission system engineering.

Tap - A transmission configuration creating an interconnection through a sort single circuit to a small or medium sized load or a generator. The new single circuit line is inserted into an existing circuit by utilizing breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.

Undercrossing – A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild - A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

ALTERNATIVES

Suzanne Phinney, D.Env.

SUMMARY OF CONCLUSIONS

In the analysis of the Carrizo Energy Solar Farm (CESF), six alternative project sites were examined, as well as several alternative generation technologies. The alternative sites would not reduce or avoid all significant impacts to Noise, and Traffic and Transportation, and potentially significant impacts to Biological Resources, Soil and Water Resources, and Visual Resources. Some of the alternative technologies could achieve most of the project objectives, but would likewise not substantially lessen or avoid environmental impacts. An alternative site configuration could reduce significant noise levels.

The six alternative sites are similar to the proposed project in size and land characteristics, and are located within reasonable proximity to transmission infrastructure. None of the sites, however, are considered to be superior to the applicant's proposed site. The Lokern site in Kern County has insufficient solar insolation. The Harper Lake site in San Bernardino County offers strong solar resources, but contains important biological habitat. The Old Mine and Daggett-Soppeland sites in San Bernardino County, in close geographic proximity to Harper Lake, were not retained because of similar expected impacts and because they, as well as the Harper Lake site, would not interconnect to Pacific Gas and Electric's (PG&E) transmission system. The Northwest Carrizo Plain site could interfere with the same migration corridors as the proposed site, and the Antelope Plain site north of the Carrizo region would also have likely impacts to biological resources. However, staff cannot conclude whether significant impacts to wildlife (pronghorn antelope, tule elk and San Joaquin kit fox) would be reduced to less than significant by considering an alternate site until staff, the California Department of Fish and Game, San Luis Obispo County and U.S. Fish and Wildlife Service complete their analysis/modeling of wildlife movement and corridor needs.

Alternative solar technologies (parabolic trough, photovoltaic, Stirling dish, and distributed tower power) were considered. As with the proposed Compact Linear Fresnel Reflector (CLFR) technology, these technologies would consume little on-site water and would not generate air pollutants. Yet with similar or greater acreage requirements, they would not lessen the environmental impacts associated with extensive land use. Other generation technologies (wind, geothermal, biomass, tidal, wave, natural gas, and nuclear) were also examined as possible alternatives to the project. Geothermal, tidal, and wave alternatives are not applicable to the Carrizo Plain. Wind power is not considered a feasible alternative as the Carrizo Plain is not identified as a productive area for development of commercial wind power. Biomass would not be practical due to the need to transport biomass fuels from outside the area which would create significant and long-term traffic impacts. Finally, a natural gas plant would not meet the project's renewable generation objective, and construction of new nuclear power plants is currently prohibited under California law.

Staff also believes that the “no project” alternative is not superior to the proposed project. The “no project” scenario would likely delay development of renewable resources, and could lead to increased operation of existing plants, which use non-renewable technologies. Furthermore, PG&E would not receive the 177 MW contribution to its renewable procurement requirement.

Therefore, while staff does not recommend alternative generation technologies over the technology proposed by Carrizo Energy, LLC, it is unable to conclude at this time whether an alternative site would meet project objectives and mitigate or reduce significant impacts to Noise, and Traffic and Transportation, and potentially significant impacts to Biological Resources, Soil and Water Resources, and Visual Resources. However, staff believes relocating the power block to an area more central to the CESF site arrangement would mitigate significant operational noise to less than significant levels. The power block would have to be moved approximately 1,000 feet toward the center of the project site from where it is currently planned to be located.

INTRODUCTION

This section considers potential alternatives to the construction and operation of the proposed CESF. The purpose of this alternatives analysis is to comply with state environmental laws by providing an analysis of a reasonable range of feasible alternative sites which could substantially reduce or avoid any potentially significant adverse impacts of the proposed project (Cal. Code Regs., tit. 14, §15126.6; Cal. Code Regs., tit. 20, §1765). This section discusses potentially significant impacts of the proposed project that were identified in various technical sections of this PSA and analyzes alternative sites and different technologies that may reduce or avoid those significant impacts.

The Energy Commission does not have the authority to approve an alternative or require CESF 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 any significant effects of the project. Ausra CA II, LLC (dba Carrizo Energy, LLC) has executed a contract with Pacific Gas & Electric Company (PG&E) that requires each of two steam turbine units to provide approximately 93 MW of capacity in summer peak conditions with no emission levels. The project is scheduled to be on-line at partial capacity by May 31, 2010, and to achieve full commercial operation by the first quarter of 2012.

CALIFORNIA ENVIRONMENTAL QUALITY ACT CRITERIA

Energy Commission siting regulations require the examination of the “feasibility of available site and facility alternatives to the applicant’s proposal which substantially lessen the significant adverse impacts of the proposal on the environment” (Title 20, California Code of Regulations, § 1765).

CEQA Guidelines Section 15126.6 (a) (Title 14, California Code of Regulation) requires an evaluation 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 (Title 14, California Code of Regulations, § 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 Guidelines* state that an environmental document does not have to consider an alternative of which the effect cannot be reasonably ascertained and of which the implementation is remote and speculative (Title 14, California Code of Regulations, §15126.6 (f)(3)).

PROJECT DESCRIPTION AND SETTING

The CESF is a nominal 177 MW net solar thermal power plant that would use Compact Linear Fresnel Reflector (CLFR) technology. The CESF project is being put forth by Carrizo Energy, LLC and would consist of a 640 acre plant and 380 acre construction laydown area. In addition to the solar components and generation equipment, the plant would require a groundwater well, raw water storage tank and supply line, access roads, offices, and maintenance facilities. Interconnection would require construction of 760 feet of 230 kV transmission line within the site boundary, along with an outside 90-foot connection to a tower in PG&E's Morro Bay-Midway 230 kV transmission line right-of-way.

The solar field would consist of 195 CLFR solar concentrating lines, with dimensions 90 feet wide, 1,268 feet long, and 5 feet high. Each line would contain ten rows divided into four segments; the row-segments would be supported on hoops (8 feet in diameter) that rotate to track the sun based on its angle above the horizon. The solar concentrating lines focus heat directly on receivers (3 feet wide, 1,268 feet long, and 56 feet high), producing steam for collection by a piping system. The steam would be delivered to eight steam drums located in the solar field and to two steam drums in the power block. The steam would then flow to two steam turbine generators that could each generate 93 MW at full load with average ambient conditions. Additionally, during construction, reflector frames would be manufactured in a temporary onsite manufacturing building.

The CESF would be located in the Carrizo Plain in eastern San Luis Obispo County, near the towns of Simmler and California Valley. The Temblor Range and the Los Padres National Forest surround the northwest to southeast running Plain, which is home to the endangered San Joaquin Valley kit fox (*Vulpes macrotis mutica*) and to the reintroduced pronghorn antelope (*Antilocarpa americana*) and tule elk (*Cervus elaphus nannodes*). The proposed solar plant site is privately-owned, unincorporated land zoned for agriculture; San Luis Obispo County permits electrical generation in agricultural zones. The site lies on disturbed ranchland bisected by SR-58, and is generally flat, with a gentle slope to the southeast. The Carrizo Plain National Monument – 6.5 miles to the southeast – contains one of California's largest remaining native grasslands and the

3,000-acre, alkaline Soda Lake. An unnamed tributary crossing the CESF project laydown area eventually drains to the lake (CESF 2007a, Section 3).

DETERMINING THE SCOPE OF THE ALTERNATIVES ANALYSIS

The purpose of staff's alternatives analysis is to determine the potential significant impacts of the CESF project and then focus on alternatives that are capable of reducing or avoiding these impacts.

To prepare this alternative analysis, the staff used the methodology summarized below:

- Describe the basic objectives of the project.
- Identify any potential significant environmental impacts of the project.
- Identify and evaluate alternative locations or site facility arrangements to determine whether the environmental impacts of the alternatives are the same, better, or worse than the proposed project.
- Identify and evaluate technology alternatives to the project which would mitigate impacts.
- Evaluate the impacts of not constructing the project to determine whether the "no project" alternative is superior to the project as proposed.

BASIC OBJECTIVES OF THE PROJECT

Carrizo Energy, LLC has identified the following project objectives (CESF 2007a, page 2-2):

- To comply with provisions of the Power Purchase Agreement, and develop a project with the potential to achieve an initial commercial on-line date in 2010;
- To safely and economically provide an efficient, reliable, and environmentally sound solar power generating facility in San Luis Obispo County capable of selling competitively priced renewable energy consistent with the needs of the surrounding areas, as well as provide additional generating capacity for the State and region as a whole;
- To minimize infrastructure needs and reduce environmental impacts by locating the plant near existing infrastructure, including: PG&E transmission lines and substation, and an adequate water supply without requiring significant modifications to the regional system;
- To avoid siting the plant in areas that are highly pristine or biologically sensitive;
- To site the facility in areas with high solar energy potential and consistent with existing land use plans which call for renewable energy development; and
- To assist California in repositioning its generation asset portfolio to use more renewable energy in conformance with State Policy, including the policy objectives

set forth in Senate Bill (SB) 1078 (California Renewable Portfolio Standard Program) and Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006).

The Energy Commission must define objectives that allow development of a reasonable range of alternatives. As a result, the applicant's objectives have been modified for this purpose as follows:

- To safely and economically construct and operate a solar power generating facility in California that will meet local, regional and state-wide needs.
- To site the facility in areas with high solar energy potential and consistent with local land use plans, and where it can be interconnected to PG&E's transmission system.
- To be commercially operational by 2010.

POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT

Potential issues associated with the CESF include groundwater, visual, noise, traffic, and biological impacts. Staff has identified the following significant impacts: 1) Biological Resources – Construction and operation of the project could significantly impact habitat and migration routes for the kit fox, tule elk, and pronghorn antelope; 2) Noise – The project's noise levels would exceed the thresholds of significance during both construction and operations; 3) Traffic and Transportation – Large trucks requiring pilot cars or California Highway Patrol escorts would cause significant traffic delays to other vehicles traveling State Route 58; and 4) Visual Resources – The project would cause a significant transformation to the Carrizo Plain, changing current rural farm land to industrial use and degrading overall visual quality. Although not identified as a significant impact, water resource issues were of concern to the community and are also considered in this analysis. These impacts are discussed in detail in the **Biological Resources, Noise and Vibration, Traffic and Transportation, Visual Resources** and **Soil and Water Resources** sections in this document.

SITE ALTERNATIVES TO THE PROJECT

This section evaluates the alternative sites identified by CESF and other site possibilities identified by staff or the public.

Staff considered the following criteria in identifying potential alternative sites:

1. Avoid or substantially lessen one or more of the potential significant effects of the project;

2. Satisfy the following criteria:

    a. Site suitability. Approximately 1,000 acres are required for the site. Site should be relatively flat and in areas of high solar insolation;

b. Availability of infrastructure. The site should be within a reasonable distance of the electric transmission system. Longer transmission connections would increase the potential for environmental impacts;

c. Compliance with general plan designation and zoning district; and

d. Availability of the site.

SITES INITIALLY IDENTIFIED FOR FURTHER EVALUATION

Four alternative sites were identified by the applicant. Very limited information and analysis was provided in the AFC for each site. The sites are as follows:

- **Daggett – Soppeland Alternative Site**. This site is east of Barstow in San Bernardino County, along the I-15 corridor. It was eliminated by the applicant because it would use federal lands, which would require compliance with the National Environmental Protection Act. Environmental permitting timeframes would cause the project to exceed the 2010 on-line date. The applicant also indicated that the site is not in the CAISO queue (CESF 2007a, page 4-1). Staff analysis, however, found that 98 percent of the area identified by the applicant (at the March 12, 2008 Data Response and Issue Resolution Workshop, is privately-owned.
- **Harper Lake Alternative Site**. This site near Harper Dry Lake (west of Barstow) is privately owned by Harper Lake LLC which intends to develop five 100MW Solar Thermal Plants by 2010 (Harper Lake LLC, 2006). The site was eliminated by the applicant due to excessive costs and also because it is not in the CAISO queue (CESF 2007a, page 4-2).
- **Old Mine Alternative Site**. This site, near Calico Ghost Town in San Bernardino County, is owned by BLM and private landowners. The applicant eliminated the site because it is not in the CAISO queue (CESF 2007a, page 4-2).
- **Lokern Alternative Site**. The “site” is basically a large region near SR-58 and I-5 in Kern County. Due diligence was not conducted by the applicant and no formal rejection of a specific site occurred.

Staff analyzed solar insolation maps, the CAISO generation queue, and land-use information to identify additional alternative sites for consideration. Sites in the Carrizo Plain vicinity or with potential interconnection to PG&E transmission were given priority:

- **Northwest Carrizo Plain Alternative Site**. The public suggested moving the site further north on the Carrizo Plain. This alternative site location is from 0.5 miles to approximately 1.5 miles north of the intersection of Bitterwater Road and SR 58 and immediately north of PG&E’s Morro Bay-Midway 230 kV transmission line.
- **Antelope Plain Alternative Site**. Also in response to public comment, staff reviewed land in the Antelope Plain, in northwest Kern County. This “site” is in the vicinity of the Arco Substation (located midway between SR-33 and the California Aqueduct, and just south of the Kings County border), which connects to a PG&E 230 kV line.

ALTERNATIVES Figure 1 identifies the approximate locations of the alternative sites identified by the applicant and by staff.

Sites not Meeting Screening Criteria

Staff rejected the three of the site locations identified above for a variety of reasons. These sites and the reasons for rejection are as follows:

- **Old Mine Alternative Site & Daggett – Soppeland Alternative Site**. As discussed below, staff has identified the Harper Lake area as a potential alternative site location. Since the Old Mine and Daggett – Soppeland sites are also in the Mojave Desert in relatively close geographic proximity to the Harper Lake site and are in Southern California Edison (SCE) territory, they are expected to have similar environmental impacts and would not interconnect to PG&E's transmission system. Therefore, these sites are not expected to provide additional environmental benefits over the Harper Lake site, would not meet the objective of interconnecting to PG&E, and are not considered further.
- **Lokern Alternative Site**. The industrial region in the SR-58 and I-5 vicinity includes oil fields, natural gas plants, a hazardous materials storage facility, and the Morro Bay-Midway transmission line. An alternative site located in this region could potentially reduce impacts to biological resources, visual, traffic and noise impacts associated with the CESF. However, the site has a higher incidence of cloud and fog cover than the proposed site (CESF 2008d). With its inferior solar resource, this alternative is not retained for further consideration.

Sites Meeting Screening Criteria

Staff is considering the following alternative sites:

Harper Lake Alternative Site. Staff requested that the applicant identify specific parcels that it considered in relation to the Harper Lake site. Of the township sections the applicant identified at the March 12 Data Response Workshop, Township 11N, Range 05W, Section 25 and adjacent Section 36 appear suitable. Solar thermal facilities are currently operating to the north and northeast (Harper Lake 2006).

According to Solargenix (2005), the Harper Lake site receives greater solar insolation (7.65 kWh/m^2-day) than the Carrizo Plain (6.72 kWh/m^2-day). The Kramer substation is located 10 miles to the southwest and would be the presumed point of interconnection. (Existing Harper Lake solar facilities – SEGS VIII and IX – connect to the Kramer substation). Development of additional solar facilities at the site would require the construction of new transmission lines to deliver new solar generation from Kramer substation to the load centers.

Staff has identified the environmental impacts that would likely result from constructing the CESF at the Harper Lake site. Staff's analysis identifies whether the Harper Lake site could substantially reduce or avoid any potentially significant adverse impacts of the proposed project.

Environmental impacts:

- Biological Resources: The CESF site is located in a pronghorn antelope migration corridor, and may also coincide with habitat for the San Joaquin kit fox and tule elk. The Harper Lake site also serves as important habitat, and may contain the state threatened Mojave ground squirrel (*Spermophilus mohavensis*) and desert tortoise (*Gopherus agassizii*). Both sites are disturbed - the CESF would be situated on disturbed ranchland and Harper Lake on a former alfalfa ranch (CESF 2007a). Based on the above, impacts to biological resources are likely to be similar.
- Noise: The CESF would have a significant impact on nearby rural residences, particularly on the northern side of the site. The area surrounding Harper Lake is undeveloped, providing for less than significant noise impacts. The town of Lockhart (1 mile to the east of the Harper Lake site) is abandoned.
- Traffic and Transportation: SR-58 would provide access to both sites. The segment between I-5 and the CESF site is narrow and limited as to truck traffic. The segment between Barstow and Bakersfield, which would access the Harper Lake site, is a truck route, providing for less adverse traffic impacts than the SR-58 segment running west from I-5 to the CESF site. Road improvements may be needed from SR-58 to the Harper Lake site. Overall, however, traffic and transportation impacts appear to be less at the Harper Lake site.
- Visual: The CESF would have significant visual impacts, changing the rural agricultural character of the Carrizo Plain. The Harper Lake site would likely not be visible to passerby on SR-58, which is approximately 5 miles south. However, new solar development in addition to the existing SEGS VIII and IX facilities could contribute to the industrialization of a remote area.
- Water Resources: The Carrizo Plain groundwater basin contains 400,000 acre feet (CESF 2007a), and the water supply is constrained. However, catch basins located on the CESF site would allow for recharge of water equivalent to or greater than that used by the project. The Harper Lake site is situated above an underground aquifer containing an estimated 6.9 million acre feet (Harper Lake, LLC 2006) and the water supply is considered excellent (Solargenix 2005). The Harper Lake site is well removed from a wetlands complex located at the edge of Harper Lake, and surface discharge/runoff from a project at this location would likely not affect the wetlands. Thus, neither site would create water supply impacts.
- Other issue areas (air quality, geology and soils, worker safety, etc.): Environmental impacts for Harper Lake would likely be similar to that of the proposed site.

The Harper Lake alternative would have similar impacts to biological and water resources, and less of an impact on noise and traffic than the proposed project. However, the Harper Lake site would not meet the project objective of interconnecting with PG&E's transmission system.

Northwest Carrizo Plain Alternative Site. Staff conducted a drive-by review of parcels along Bitterwater Road. Land 0.5 miles north of the transmission line and directly east of Bitterwater Road (roughly Township 29S, Range 18E, Section 19) appeared feasible.

Other potential sites in the Carrizo Plain are limited given the 6,200 acre OptiSolar facility proposed to locate to the north and west of the CESF and the SunPower facility proposed to locate on approximately 3.5 square miles to the south and east of CESF. There are approximately five residences, farmsteads, or other structures within one mile of the Bitterwater Road location. Vehicles would most likely use SR-58 to access the site.

Staff has identified the environmental impacts that would likely result from constructing the CESF at the Northwest Carrizo Plain Alternative site. Staff's analysis identifies whether this site could substantially reduce or avoid any potentially significant adverse impacts of the proposed project.

Environmental impacts:

- Biological resources: As with the proposed site, this site may also interfere with pronghorn antelope movement as well as San Joaquin kit fox and tule elk habitat. Similar impacts to biological resources are expected.
- Noise: Scattered rural residences are found in the vicinity of this alternative; however with fewer sensitive receptors, noise impacts may be less than at the CESF site, depending on location of the power block.
- Traffic: SR 58 is the main access route as with the proposed site. Impacts from construction truck traffic are thus expected to be similar.
- Visual: While fewer residences may have a direct view of this alternative site, a solar facility would likewise industrialize what is currently farmland. Thus visual impacts would be similar or slightly less than the proposed site.
- Water resources: As discussed above, the proposed project would recharge the water equivalent of that used by the project, for no net withdrawal to the Carrizo Plain groundwater basin. Assuming similar recharge at this site, no water supply impacts would likewise be expected.
- Other issue areas (air quality, geology and soils, worker safety, etc.): Other environmental impacts for the Northwest Carrizo Plain site would likely be similar to that of the proposed site.

The Northwest Carrizo Plain alternative would have similar impacts to biological, visual, and water resources, and to traffic and transportation. Noise impacts may be reduced.

Antelope Plain Alternative Site. Solar thermal resource maps (NREL 2007) indicate a level of solar insolation for the Antelope Plain similar to the Carrizo Plain. The area features transmission lines, agriculture, and oil fields. SR -33 provides access. The site, however, has not been comprehensively studied for Compact Linear Fresnel Reflector suitability and transmission feasibility.

Staff has identified the environmental impacts that would likely result from constructing the CESF at the Antelope Plain Alternative site. The analysis below identifies whether

this site could substantially reduce or avoid any potentially significant adverse impacts of the proposed project.

Environmental impacts:

- Biological Resources: The blunt-nosed leopard lizard (*Gambelia sila*), burrowing owl (*Athene cunicularia)*, and San Joaquin kit fox are found in the area. The site coincides with Green Zoned portions of Kern County's Valley Floor Habitat Conservation Plan (HCP). Green Zone areas have second highest conservation priority and the HCP aims to conserve 75 percent of existing natural lands in this zone. Based on this designation, impacts to biological resources would also be likely at this site.
- Noise: With no residences or other sensitive receptors (in the Arco substation area), noise impacts from the Antelope Plain alternative would likely be less than significant.
- Traffic and Transportation: SR-33 traverses the Antelope Plain and connects to I-5 via SR-41 (from the north) or SR-46 (from the south). Road improvements may be needed from SR-33 to reach the site. These routes are generally flatter and straighter than SR-58 to the proposed site, thus reducing traffic impacts during construction compared to the proposed project.
- Visual: The Antelope Valley is characterized by large-scale agriculture surrounded by low hills and oil fields. As such, the impact on visual resources may be less significant than in the Carrizo Plain.
- Water Resources: The Antelope Plain overlays the 3,040 square mile Kern County subbasin of the San Joaquin Valley groundwater basin. The subbasin's total water storage is estimated at 40 million acre feet (DWR 2006). As with the proposed site, no impacts to water resources would be expected if catch basins are used to recharge the water equivalent to that used by the project.
- Other issue areas (air quality, geology and soils, worker safety, etc.): Other environmental impacts for the Antelope Plain would likely be similar to that of the proposed site.

Transmission interconnection and permitting timeframes at the Antelope Plain site would push the project beyond the 2010 on line schedule included as a project objective. Additionally, the applicant does not have site control.

Overall, the three site alternatives evaluated above – Harper Lake, Northwest Carrizo Plain, and Antelope Plain – offer some advantages, but no substantial reduction of significant environmental impacts.

SITE FACILITY ARRANGEMENT ALTERNATIVE

In the proposed facility arrangement, the power block (consisting of two STGs with associated condensing and cooling systems) would be on the northern edge of the site. Staff has determined that project operations (primarily noise from the power block)

would result in 42 dBA above the recommended level of 40 dBA (see **Noise and Vibration** section of this document). Relocating the power block to a more central part of the CESF site (approximately 1,000 feet toward the center of the site) would mitigate significant operational noise to less than significant levels. Staff needs the applicant to evaluate this alternative in a draft Noise Mitigation Plan.

GENERATION TECHNOLOGY ALTERNATIVES

CONSERVATION AND DEMAND SIDE MANAGEMENT

One alternative to meeting California's electricity demand with new generation is to reduce the demand for electricity. Such *demand side*[1] measures include programs that increase energy efficiency, reduce electricity use, or shift electricity use away from peak hours of demand.

In California there is a considerable array of demand side programs. At the federal level, the Department of Energy adopted national standards for appliance efficiency and building standards to reduce the use of energy in federal buildings and at military bases. At the state level, the Energy Commission adopted comprehensive energy efficiency standards for most buildings, appliance standards for specific items not subject to federal appliance standards, and is in the process of adopting load management standards. The Energy Commission also provides grants for energy efficiency development through the Public Interest Energy Research (PIER) program.

The California Public Utilities Commission, along with the Energy Commission, oversees investor-owned utility demand side management programs financed by the utilities and their ratepayers. At the local level, many municipal utilities administer demand side management and energy conservation programs. These include subsidies for the replacement of older appliances through rebates, building weatherization programs, and peak load management programs. In addition, several local governments have adopted building standards which exceed the state standards for building efficiency, or have by ordinance set retrofit energy efficiency requirements for older buildings. New buildings may combine the need for heat and power through a single fuel source or a common source may supply heating and/or heating and cooling to a number of adjacent buildings, increasing overall efficiency.

Even with this great variety of federal, state, and local demand side management programs, the state's electricity use is still increasing as a result of population growth and business expansion. Current demand side programs are not sufficient to satisfy future electricity needs, nor is it likely that even more aggressive demand side programs could accomplish this, given the economic and population growth rates of the last 10 years.

[1] Planning, implementation, and evaluation of utility-sponsored programs to influence the amount or timing of customers' energy use

Therefore, although it is likely that federal, state, and local demand side programs will receive even greater emphasis in the future, both new generation and new transmission facilities will be needed in the immediate future and beyond in order to maintain adequate supplies.

ALTERNATIVE SOLAR RESOURCES

Staff evaluated other solar generation technologies that have been implemented for utility-scale production. The solar alternatives could achieve most of the project objectives, but would not substantially lessen or avoid environmental impacts and may require greater land use. As such, staff is not retaining the following technologies:

- **Parabolic Trough.** Each parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun's direct beam radiation on a linear heat collection element at the focus of the parabola. Parabolic trough technology requires approximately 4 to 5 acres per MW. A 177 MW solar field would thus encompass 700-900 acres of land, resulting in a slightly greater land use than the proposed technology. Furthermore, wet-cooling would require significant water use on the order of 10,200 acre-feet per year (AFY) for a 177 MW plant. Dry-cooling would only require 32 AFY for 177 MW (50 percent greater than the 22 AFY estimated for CESF) – but has not been proposed for a parabolic trough plant in California due to economic factors (NRDC and Sierra Club 2008).
- **Photovoltaic.** Panels composed of semiconductor materials – crystalline silicon, cadmium telluride, copper indium gallium diselinide, or amorphous silicon – absorb solar radiation and convert it directly to electricity. The panels are mounted at a fixed-angle or on tracking structures. Their black surface enhances sunlight absorption and reduces glare. Photovoltaic can require from 4 acres/MW (crystalline silicon) to 10 acres/MW (thin film and tracking) (NRDC and Sierra Club 2008). While water is not required for electricity generation, 2 to 10 acre feet per year (AFY) per 100 MW may be needed to wash panels (NRDC and Sierra Club 2008). The 550 MW Topaz Solar Farm proposed for the northwest Carrizo Plain is projected to use 6,200 acres of land and 3.5 AFY of water during operations (Topaz Solar Farms 2008).
- **Stirling Dish.** A paraboloid dish of mirrors focuses sunlight on the receiver end of a Stirling engine. A Stirling engine field requires 7 to 9 acres per MW; generation of 177 MW could thus require 2 to 2.5 times the land requirement for the CESF project. For example, the proposed SES Solar 2 Project in Imperial County would comprise 30,000 Stirling dishes to generate 750 MW on 6,500 acres (SES Solar 2 2008). Stirling technology – with dishes 38 feet tall and 40 feet wide (in the case of SES Solar 2) – would have similar, if not greater, visual impacts than CLFR structures.
- **Distributed Power Tower.** A large field of mirrors (the heliostat) surrounds and focuses light on an elevated tower. The towers would be significantly taller than the CLFR receivers; the proposed Ivanpah Solar Electric Generating System would consist of 3 towers with heights from 300 to 440 feet. Also, the circular heliostat arrangement may be less efficient in terms of land use, and the 400 MW Ivanpah

plant would require approximately 3,680 acres for solar generation (Solar Partners 2007).

ALTERNATIVE TECHNOLOGIES

Staff also considered other renewable and non-renewable energy sources. Some of the technologies – although viable in California - would not be applicable to the Carrizo Plain.

- **Wind.** Wind carries kinetic energy that can be utilized to spin the blades of a wind turbine rotor and an electrical generator, which then feeds alternating current (AC) into the utility grid. Wind turbines currently being manufactured have power ratings ranging from 250 watts to 1.8 MW (AWEA 2004). Land use requirements average 5.4 acres/MW (CEC 2008), although the turbine footprints only take 5 percent of the area (AWEA 2004). Environmental impacts include bird and bat collisions and visual pollution. The Carrizo Plain, however, has poor to marginal wind resource potential (EERE 2008), and a utility scale wind farm would not be viable.
- **Geothermal.** Steam or high-temperature water from geothermal reservoirs is harnessed to drive steam turbine/generators. Geothermal plants range in size from under 1 MW to 110 MW, and require 0.2 to 0.5 acre/MW. Geothermal plants provide highly reliable base-load power, with capacity factors from 90 to 98 percent. Plants, however, must be built near geothermal reservoir sites, as steam and hot water cannot be transported long distances without significant thermal energy loss. There are no known geothermal resources in the Carrizo Plain area.
- **Biomass.** Electricity is generated by burning organic fuels in a boiler to produce steam, which then turns a turbine. Biomass can also be converted into a fuel gas such as methane and burned. Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing wastes, and construction and urban wood wastes. Biomass facilities do not require an extensive amount of land for the actual facility, although fuel production could require extensive acreage if specifically farmed. Biomass facilities are generally small-scale, in the range of 3 to 10 MW. Furthermore, there is no large fuel source in the Carrizo Plain area, and ongoing truck deliveries would be required to supply the plant with biomass fuel.
- **Tidal and Wave.** Tidal generation of electricity involves building a dam, known as a barrage, across a bay or estuary. Water retained behind a dam at high tide produces a power head sufficient to generate electricity as the tide ebbs and water released from within the dam turns conventional turbines. Wave energy technologies - which include terminator devices, point absorbers, attenuators, and overtopping devices – extract energy from surface wave motion or subsurface pressure fluctuations (MMS 2007). These tidal and wave technologies, many of which are in the research and development stage, would not apply to the inland Carrizo Plain.
- **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 source of natural gas and a water connection are required. Staff is not retaining this non-renewable

alternative since it would not attain the project objective of constructing and operating a renewable power generating facility in California.

- **Nuclear.** 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).

ALTERNATIVE LINEAR ROUTES AND WATER SUPPLY OPTIONS

Transmission access and water are within the property boundaries so no alternative routes are identified. Water supply could be either via the onsite well or by trucking. Given the emissions associated with truck travel and the safety issues associated with SR-58, trucking does not appear to be a viable option.

THE "NO PROJECT" ALTERNATIVE

The "no project" alternative under CEQA assumes that the project is not constructed. In the CEQA analysis, the "no project" alternative is compared to the proposed project and determined to be superior, equivalent, or inferior to it. 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. §15126.6(i)). Toward that end, 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…" (§15126.6(e)(2)). CEQA Guidelines and Energy Commission regulations require consideration of the "no project" alternative. The no-action alternative is compared to the effects of the proposed action. In short, the site-specific and direct impacts associated with the power plant would not occur at this site if the project does not go forward.

If the "no project" alternative were selected, the construction and operational impacts of the CESF project would not occur. Demolition of existing buildings at the site would not occur nor would installation of new foundations, CLFR equipment, piping, and utility connections be required. There would be no significant impacts to biological resources. Cumulative impacts of the CESF and proposed Topaz Solar Farm projects would be avoided.

In the absence of the CESF project, however, other power plants could likely be constructed in the project area or in California to serve the demand that could be met with the CESF project. These plants could have greater environmental impacts than the proposed project. In the near term, the more likely result is that existing plants, many of which use non-renewable resources, could operate more.

If the project is not built, the region will not benefit from the clean, renewable and efficient source of new generation that this facility would provide. PG&E would not

receive the 177 MW contribution to the 20 percent of energy from renewable resources that they must procure by 2010. The contractual requirements of the applicant's Power Purchase Agreement (PPA) would not be met. In addition, there may be substantial transmission interconnection delays in if the project were sited elsewhere.

Considering the above, the no-action alternative is not considered superior to the proposed project.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

In comments submitted on 2-19-08, John Ruskovich suggested the Lokern area as an alternative site due to its industrial nature and proximity to the California Aqueduct, I- 5, and a hazardous waste dump. Robin Bell suggested considering sites a few miles north to the north of the proposed site on the Carrizo Plain. She commented that there would be less impact on residential sites because the area consists of larger, typically 640 acre sites (2008a). The sites recommended by John Ruskovich and Robin Bell are discussed in the preceding analyses of the Lokern and Northwest Carrizo Plain alternative sites, respectively.

No agency comments pertaining to Alternatives have been received.

CONCLUSIONS AND RECOMMENDATION

Staff has analyzed in detail project site and technology alternatives, conservation measures, and the "no project" alternative. The three site alternatives retained in this section offer some advantages, but no substantial reduction of significant environmental impacts. Staff cannot conclude whether potential significant impacts to biological resources would be reduced to less than significant levels until wildlife modeling is completed. Staff is thus unable to conclude at this time whether an alternative site would meet project objectives and mitigate or reduce significant impacts to Noise, and Traffic and Transportation, and potentially significant impacts to Biological Resources, Soil and Water Resources, and Visual Resources. However, an alternative location for the power block within the CESF site could reduce noise impacts to less than significant levels.

Other solar technologies may require greater land or water use, and would likewise not substantially lessen environmental impacts. Wind, geothermal, biomass, tidal, wave, natural gas, and nuclear are not considered feasible alternatives. Finally, the "no project" alternative would eliminate all impacts of this project. However, the benefits of increasing local renewable generation would not be achieved.

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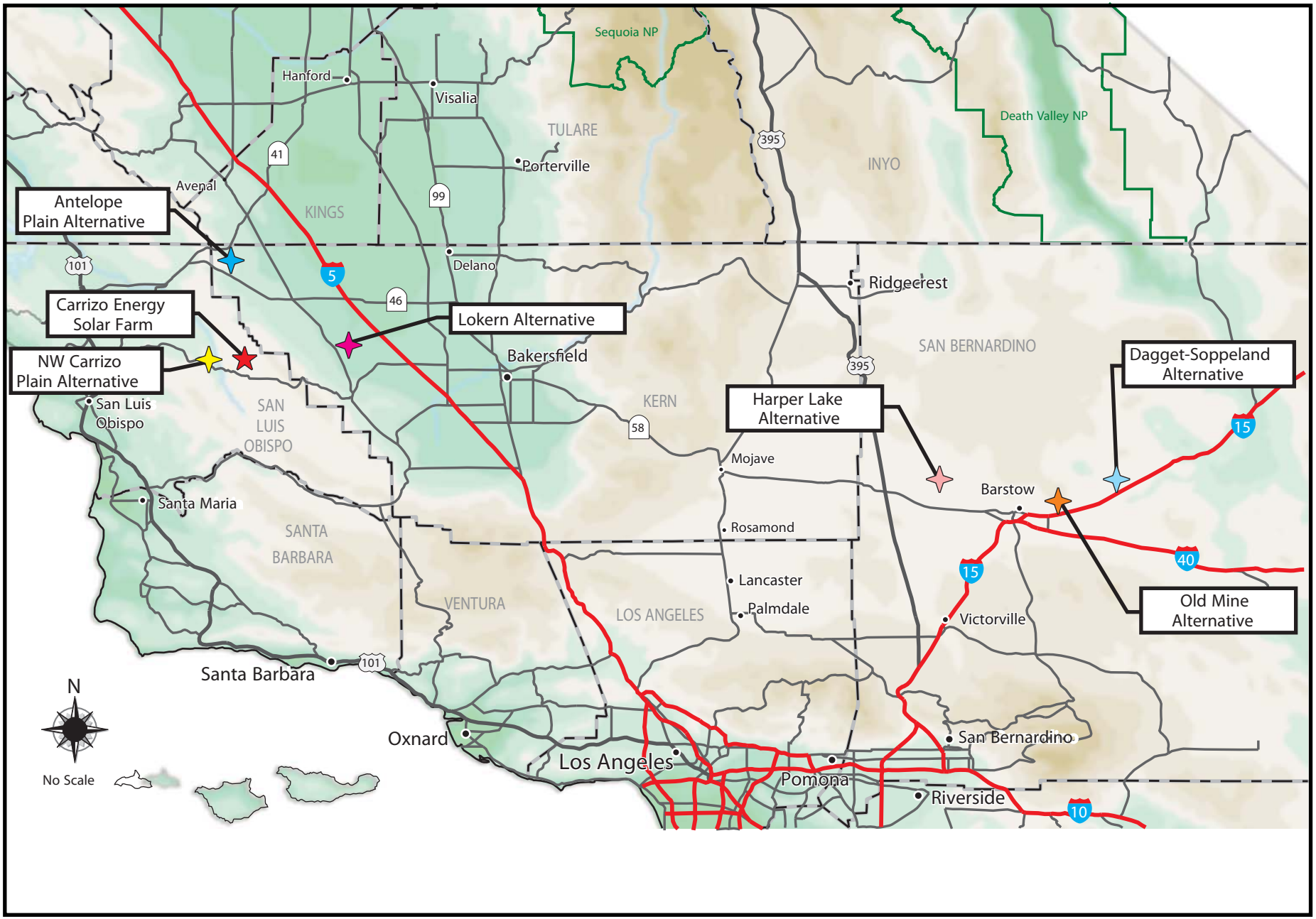
ALTERNATIVES - FIGURE 1

Carrizo Energy Solar Farm Project - Carrizo Alternatives



NOVEMBER 2008

ALTERNATIVES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMETAL PROTECTION DIVISION,NOVEMBER 2008

SOURCE: Aspen Environmetal Group

GENERAL CONDITIONS
INCLUDING
COMPLIANCE MONITORING AND CLOSURE PLAN

Mary Dyas

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 Compliance Plan is composed of elements that:

set forth the duties and responsibilities of the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;

set forth the requirements for handling confidential records and maintaining the compliance record;

state procedures for settling disputes and making post-certification changes;

state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission approved conditions of certification;

establish requirements for facility closure plans; and

specify conditions of certification for each technical area containing the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure below a level of significance. Each specific condition of certification also includes a verification provision that describes the method of assuring that the condition has been satisfied.

DEFINITIONS

The following terms and definitions are used to establish when Conditions of Certification are implemented.

PRE-CONSTRUCTION SITE MOBILIZATION

Pre-construction site mobilization consists of limited 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 pre-

construction site mobilization. Walking, driving or parking a passenger vehicle, pickup truck and light vehicles is allowable during pre-construction site mobilization.

CONSTRUCTION

Onsite work to install permanent equipment or structures for any facility. This includes the following:

Ground disturbance: 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: 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.

Not withstanding the definitions of ground disturbance, and grading, boring, and trenching above, construction does **not** include the following:

1. the installation of environmental monitoring equipment;

2. a soil or geological investigation;

3. a topographical survey;

4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and

5. any work to provide access to the site for any of the purposes specified in "Construction" 1, 2, 3, or 4 above.

START OF COMMERCIAL OPERATION

For compliance monitoring purposes, "commercial operation" begins after the completion of start-up and commissioning, when the power plant has reached reliable steady-state production of electricity at the rated capacity. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager.

COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

The Compliance Project Manager (CPM) shall oversee the compliance monitoring and is responsible for:

1. Ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Energy Commission Decision

2. Resolving complaints

3. Processing post-certification changes to the conditions of certification, project description (petition to amend), and ownership or operational control (petition for change of ownership) (See instructions for filing petitions)

4. Documenting and tracking compliance filings

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 word files).

PRE-CONSTRUCTION AND PRE-OPERATION COMPLIANCE MEETING

The CPM usually schedules pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings is to assemble both the Energy Commission's and project owner's technical staff to review the status of all pre-construction or pre-operation requirements, contained in the Energy Commission's conditions of certification. This is to confirm that all applicable conditions of certification have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings ensure, to the extent possible, that Energy Commission conditions will not delay the construction and operation of the plant due to oversight and to preclude any last minute, unforeseen issues from arising. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

ENERGY COMMISSION RECORD

The Energy Commission shall maintain the following documents and information as a public record, in either the Compliance file or Dockets file, for the life of the project (or other period as required):

1. All documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility

2. All monthly and annual compliance reports filed by the project owner

3. All complaints of noncompliance filed with the Energy Commission

4. All petitions for project or condition of certification changes and the resulting staff or Energy Commission action.

PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that the compliance conditions of certification and all other conditions of certification that appear in the Commission

Decision are satisfied. The compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, conditions of certification, or ownership. Failure to comply with any of the conditions of certification or the compliance conditions may result in reopening of the case and revocation of Energy Commission certification; an administrative fine; or other action as appropriate. A summary of the Compliance Conditions of Certification is included as **Compliance Table 1** at the conclusion of this section.

COMPLIANCE WITH 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 and, in most cases, without full Energy Commission approval.

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
(07-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; and
7. the compliance status of each condition, e.g., "not started," "in progress" or "completed" (include the date).
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 this section.

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 (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

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 Dockets Unit with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq.

Annual Energy Facility Compliance Fee (COMPLIANCE-9)

Pursuant to the provisions of Section 25806(b) of the Public Resources Code, the project owner is required to pay an annual compliance fee, which is adjusted annually. The amount of the fee for FY2007-2008 was $17,676. The initial payment is due on the date the Energy Commission adopts the final decision. You will be notified of the amount due. All subsequent payments are due by July 1 of each year in which the facility retains its certification. The payment instrument shall be made payable to the California Energy Commission and mailed to: Accounting Office MS-02, California Energy Commission, 1516 9th St., Sacramento, CA 95814.

Reporting of Complaints, Notices, and Citations (COMPLIANCE-10)

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering with date and time stamp recording. All recorded complaints shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to the CPM who will post it on the Energy Commission's web page at:

http://www.energy.ca.gov/sitingcases/power_plants_contacts.html

Any changes to the telephone number shall be submitted immediately to the CPM, who will update the web page.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).

FACILITY CLOSURE

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

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

CLOSURE DEFINITIONS

Planned Closure

A planned closure occurs when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

Unplanned Temporary Closure

An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency.

Unplanned Permanent Closure

An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unplanned closure where the owner implements the on-site contingency plan. It can also include unplanned closure where the project owner fails to implement the contingency plan, and the project is essentially abandoned.

COMPLIANCE CONDITIONS FOR FACILITY CLOSURE

Planned Closure (COMPLIANCE-11)

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the CPM) prior to 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 the desires of local officials or interested parties are inconsistent with the plan, the CPM shall hold one or more workshops and/or the Energy Commission may hold public hearings as part of its approval procedure.

As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until the Energy Commission approves the facility closure plan.

Unplanned Temporary Closure/On-Site Contingency Plan (COMPLIANCE-12)

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

The project owner shall submit an on-site contingency plan for CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation. The approved plan must be in place prior to commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with the CPM, will update the on-site contingency plan as necessary. The CPM may require revisions to the on-site contingency plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the on-site contingency plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by the CPM.

The on-site contingency plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by the CPM, the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management.)

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

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

If the CPM determines that an unplanned temporary closure is likely to be permanent, or for a duration of more than 12 months, a closure plan consistent with the requirements for a planned closure shall be developed and submitted to the CPM within 90 days of the CPM's determination (or other period of time agreed to by the CPM).

Unplanned Permanent Closure/On-Site Contingency Plan (COMPLIANCE-13)

The on-site contingency plan required for unplanned temporary closure shall also cover unplanned permanent facility closure. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure.

In addition, the on-site contingency plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment.

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

A closure plan, consistent with the requirements for a planned closure, shall be developed and submitted to the CPM within 90 days of the permanent closure or another period of time agreed to by the CPM.

Post Certification Changes to the Energy Commission Decision: Amendments, Ownership Changes, Insignificant Project Changes and Verification Changes (COMPLIANCE-14)

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the project (including linear facilities) design, operation or performance requirements, and to transfer ownership or operational control of the facility. It is the responsibility of the project owner to contact the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769. Implementation of a project modification without first securing Energy Commission, or Energy Commission staff approval, may result in enforcement action that could result in civil penalties in accordance with section 25534 of the Public Resources Code.

A petition is required for amendments and for insignificant project changes 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 you with 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 you with a sample petition to use as a template.

Insignificant Project Change

Modifications that do not result in deletions or changes to conditions of certification, and that are compliant with laws, ordinances, regulations and standards may be authorized by the CPM as an insignificant project change pursuant to section 1769(a) (2). This process usually requires minimal time to complete, and it requires a 14-day public review of the Notice of Insignificant Project Change that includes staff's intention to approve the modification unless substantive objections are filed. These requests must also be submitted in the form of a "petition to amend" as described above.

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.

CBO DELEGATION AND AGENCY COOPERATION

In performing construction and operation monitoring of the project, Energy Commission staff acts as, and has the authority of, the Chief Building Official (CBO). Energy Commission staff may delegate CBO responsibility to either an independent third party contractor or the local building official. Energy Commission staff retains CBO authority

when selecting a delegate CBO, including enforcing and interpreting state and local codes, and use of discretion, as necessary, in implementing the various codes and standards.

Energy Commission staff may also seek the cooperation of state, regional and local agencies that have an interest in environmental protection when conducting project monitoring.

ENFORCEMENT

The Energy Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Energy Commission Decision. The specific action and amount of any fines the Energy Commission may impose would take into account the specific circumstances of the incident(s). This would include such factors as the previous compliance history, whether the cause of the incident involves willful disregard of LORS, oversight, unforeseeable events, and other factors the Energy Commission may consider.

NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1237, but in many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by future law or regulations.

The Energy Commission has established a toll free compliance telephone number of **1-800-858-0784** for the public to contact the Energy Commission about power plant construction or operation-related questions, complaints or concerns.

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 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 Start of Steam 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	The project owner shall submit a compliance matrix (in a spreadsheet format) with each monthly and annual compliance report which includes the status of all compliance conditions of certification.
COMPLIANCE-6	Monthly Compliance Report including a Key Events List	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due the month following the Energy Commission business meeting date on which the project was approved and shall include an initial list of dates for each of the events identified on the Key Events List.
COMPLIANCE-7	Annual Compliance Reports	After construction ends and throughout the life of the project, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.

CONDITION NUMBER	SUBJECT	DESCRIPTION
COMPLIANCE-8	Confidential Information	Any information the project owner deems confidential shall be submitted to the Energy Commission's Dockets Unit with a request for confidentiality.
COMPLIANCE-9	Annual fees	Payment of Annual Energy Facility Compliance Fee
COMPLIANCE-10	Reporting of Complaints, Notices and Citations	Within 10 days of receipt, the project owner shall report to the CPM, all notices, complaints, and citations.
COMPLIANCE-11	Planned Facility Closure	The project owner shall submit a closure plan to the CPM at least 12 months prior to commencement of a planned closure.
COMPLIANCE-12	Unplanned Temporary Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.
COMPLIANCE-13	Unplanned Permanent Facility Closure	To ensure that public health and safety and the environment are protected in the event of an unplanned permanent closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation.
COMPLIANCE-14	Post-certification changes to the Decision	The project owner must petition the Energy Commission to delete or change a condition of certification, modify the project design or operational requirements and/or transfer ownership of operational control of the facility.

ATTACHMENT A

COMPLAINT REPORT/RESOLUTION FORM

PROJECT NAME: AFC Number:
COMPLAINT LOG NUMBER _____ Complainant's name and address: Phone number: _____
Date and time complaint received: Indicate if by telephone or in writing (attach copy if written): Date of first occurrence:
Description of complaint (including dates, frequency, and duration):
Findings of investigation by plant personnel: Indicate if complaint relates to violation of a CEC requirement: Date complainant contacted to discuss findings: _____
Description of corrective measures taken or other complaint resolution: Indicate if complainant agrees with proposed resolution: If not, explain: Other relevant information:
If corrective action necessary, date 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: _____ Date:

(Attach additional pages and supporting documentation, as required.)

PREPARATION TEAM

CARRIZO ENERGY SOLAR FARM
PRELIMINARY STAFF ASSESSMENT
PREPARATION TEAM

Executive Summary .....John Kessler

Introduction .....John Kessler

Project Description .....John Kessler

Air Quality..... Tuan Ngo, P.E. and Matthew Layton, P.E.

Biological Resources..... Brian McCollough

Cultural Resources..... Beverly E. Bastian and Carol Roland

Hazardous Materials ..... Geoff Lesh, P.E. and Rick Tyler

Land Use.....Negar Vahidi

Noise and Vibration ..... Shahab Khoshmashrab

Public Health ..... Obed Odoemelam, Ph.D.

Socioeconomics .....Jacob Hawkins M.E.S.M.

Soil and Water Resources…… ..... Mark Lindley

Traffic and Transportation ..... Jason Ricks

Transmission Line Safety and Nuisance ..... Obed Odoemelam, Ph.D.

Visual Resources ..... Mark Hamblin

Waste Management .....Suzanne Phinney, D.Env.

Worker Safety and Fire Protection ..... Geoff Lesh, P.E. and Rick Tyler

Facility Design ..... Erin Bright and Steve Baker

Geology and Paleontology .....Dal Hunter, Ph.D., C.E.G.

Power Plant Efficiency..... Erin Bright and Steve Baker

Power Plant Reliability..... Erin Bright and Steve Baker

Transmission System Engineering ..... Sudath Arachchige and Mark Hesters

Alternatives .....Suzanne Phinney, D.Env.

General Conditions..... Mary Dyas

Project Assistant .....Hilarie Anderson

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 CARRIZO ENERGY SOLAR FARM PROJECT***	**Docket No. 07-AFC-8** **PROOF OF SERVICE** **(Revised 11/14/2008)**

INSTRUCTIONS: All parties shall either (1) send an original signed document plus 12 copies or (2) mail one original signed copy AND e-mail the document to the address for the Docket as shown below, AND (3) all parties shall also send a printed or electronic copy of the document, which includes a proof of service declaration to each of the individuals on the proof of service list shown below:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 07-AFC-8
1516 Ninth Street, MS-15
Sacramento, CA 95814-5512
docket@energy.state.ca.us

APPLICANT

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DECLARATION OF SERVICE

I, Hilarie Anderson, declare that on November 21, 2008, I deposited copies of the attached Carrizo Energy Solar Farm Preliminary Staff Assessment in the United States mail at Sacramento, CA with first-class postage thereon fully prepaid and addressed to those identified on the Proof of Service list above.

OR

Transmission via electronic mail was consistent with the requirements of California Code of Regulations, title 20, sections 1209, 1209.5, and 1210. All electronic copies were sent to all those identified on the Proof of Service list above.

I declare under penalty of perjury that the foregoing is true and correct.

Original Signature in Dockets
Hilarie Anderson

*indicates change