CHAPTER 3
Affected Environment

3.1 Introduction

The project site is located in the California inland desert, approximately 0.5 mile north of U.S. Interstate-10 (I-10) approximately 35 miles west of Blythe and approximately 10 miles east of Desert Center, in an unincorporated area of eastern Riverside County, California (see Figure 1-1).[1] The proposed project would consist of two adjacent, independent power block units (Units) of 250 MW nominal capacity each, for a total nominal capacity of 500 MW. A single-circuit 230 kilovolt (kV) overhead transmission line (gen-tie) would connect the project to the regional power grid at Southern California Edison's proposed Red Bluff Substation about 5 miles southwest of the project site. The Applicant has applied for a right-of-way (ROW) grant from BLM for approximately 5,200 acres of flat desert terrain. Acreage not disturbed by the proposed action within the requested ROW would not be part of the ROW grant.

Chapter 3 describes the environmental resources of BLM-administered lands in the action area that could be affected by implementation of the proposed action. Chapter 3 describes resources, resource uses, special designations, and other important topics (e.g., public health and safety, social and economic considerations, and environmental justice conditions) that may be impacted by the proposed action. "Resources" include air, soil, water, vegetation communities, wildlife, wildland fire ecology and management, as well as cultural, paleontological, and visual resources. "Resource uses" include livestock grazing management, minerals, recreation management, transportation and public access, and lands and realty. "Special designations" include, for example, areas of critical environmental concern (ACECs), wilderness areas (WAs), and back-country byways.

Information and data used to prepare this chapter were obtained from the CDCA Plan and various other BLM planning documents. Information and data also were collected from the RSA, SA/DEIS, and research publications prepared by various Federal and State agencies as well as by private sources pertaining to key resource conditions and resource uses found within the project area. The purpose of this chapter is to provide a description of affected resources and BLM program areas within the existing environment of the project area that will be used as a baseline to evaluate and assess the impact of the proposed action and alternatives described in Chapter 2, *Proposed Action and Alternatives*. Descriptions and analyses of the impacts themselves are presented in Chapter 4, *Environmental Consequences*.

[1] All figures referenced are included in Appendix A.

3.2 Air Quality

This section describes air quality conditions for criteria pollutants and the federal and state ambient air quality standards. A discussion regarding global climate change and greenhouse gases can be found in Section 3.3, *Global Climate Change*. The proposed project is within the Mojave Desert Air Basin (MDAB). Relatively high daytime temperatures; large variations in relative humidity; large and rapid diurnal temperature changes; occasional high winds; and sand, dust, and thunderstorms characterize the climate. The aridity of the region is influenced by a sub-tropical high-pressure system typically off the coast of California and topographical barriers that effectively block the flow of moisture to the region. The Colorado Desert experiences two rainy seasons per year. The first occurs during the winter; the second is the summer monsoon.

The monthly average high temperature in Desert Center is 104°F in July. The lowest average monthly temperature is 45°F in January and December (CEC RSA, 2010). Total rainfall in Desert Center averages just less than four inches per year with about 50 percent of the total rainfall occurring from December through March, and about 30 percent occurring during the August/ September summer monsoon season.

Wind data from the Blythe Airport for the years 2003 to 2007 indicate the highest annual wind direction frequencies are from the south through the southwest. Due to local topography, a more westerly wind direction is expected at the site. Calm conditions occur approximately 17 percent of the time, with the annual average wind speed approximately 8.5 miles per hour (mph) (CEC RSA, 2010). Mixing heights in the area, which represent the altitudes where different air masses mix together, are estimated to be on average 230 feet (70 meters) in the morning to as high as 5,250 feet (1,600 meters) above ground level in the afternoon.

3.2.1 Ambient Air Quality

The Federal Clean Air Act and the California Clean Air Act both require the establishment of standards for ambient concentrations of criteria air pollutants for ozone, NO_2, CO, sulfur dioxide (SO_2), particulate matter (i.e., PM10, PM2.5), and lead, called Ambient Air Quality Standards (AAQS). These pollutants are called “criteria” air pollutants because standards have been established for each of them to meet specific public health and welfare criteria. The state standards, established by the California Air Resources Board, typically are more protective than the federal standards, which are established by the United States Environmental Protection Agency (EPA). Federal and state air quality standards are listed in Table 3.2-1. The times over which the various air quality standards 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).

Currently, the ambient air quality within the MDAB is classified in the nonattainment category for state ozone and fugitive dust particulate matter less than 10 micrometers in diameter (PM10) criteria. According to the Northern & Eastern Colorado Desert Coordinated Management Plan,

TABLE 3.2-1
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 ppm[a] (147 μg/m^3)	0.070 ppm (137 μg/m^3)
	1 Hour	—	0.09 ppm (180 μg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm (100 μg/m^3)	0.03 ppm (57 μg/m^3)
	1 Hour	0.100 ppm[b]	0.18 ppm (339 μg/m^3)
Sulfur Dioxide (SO_2)	Annual		—
	24 Hour		0.04 ppm (105 μg/m^3)
	3 Hour	0.5 ppm (1300 μg/m^3)	—
	1 Hour	0.075 ppm (195 μg/m^3)	0.25 ppm (655 μg/m^3)
Particulate Matter (PM10)	Annual	—	20 μg/m^3
	24 Hour	150 μg/m^3	50 μg/m^3
Fine Particulate Matter (PM2.5)	Annual	15 μg/m^3	12 μg/m^3
	24 Hour	35 μg/m^3	—
Sulfates (SO_4)	24 Hour	—	25 μg/m^3
Lead	30 Day Average	—	1.5 μg/m^3
	Rolling 3-Month Average	0.15 μg/m^3	—
	Calendar Quarter	1.5 μg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 μg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 μg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

NOTES:
[a] The 2008 standard is shown above, but as of January 19, 2010 this standard is being reconsidered for revision to between 0.060 and 0.070 ppm. The 1997 8-hour standard is 0.08 ppm.
[b] The U.S. EPA is in the process of implementing this new standard, which became effective April 12, 2010. This standard is based on the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations.

SOURCES: CEC RSA, 2010 (Air Quality Table 2); CEC Commission Decision (Air Quality Table 1); Federal Register, Vol. 75, No. 11, page 2938.

the ozone standard is exceeded due to long distance transport of pollutants from the Los Angeles Basin, while the PM10 standard is due to natural sources found in a desert environment and various land uses. These uses include off-highway vehicle use, mining, and livestock grazing.

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. An unclassified area is normally treated by the U.S. EPA the same as an attainment area for regulatory purposes. An area could be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same air contaminant.

The project site is within the jurisdiction of the South Coast Air Quality Management District (SCAQMD), which more generally includes the counties of Riverside, San Bernardino, Orange and Los Angeles. The Riverside County portion of the MDAB is designated as non-attainment for the state ozone and PM10 standards. This area is designated as attainment or unclassified for all federal criteria pollutant ambient air quality standards and the state CO, NO_2, SO_2, and particulate matter less than 2.5 micrometers in diameter (PM2.5) standards. Table 3.2-2 summarizes the site area's attainment status for various applicable federal and state standards.

TABLE 3.2-2
FEDERAL AND STATE ATTAINMENT STATUS
PROJECT SITE AREA WITHIN THE MDAB PORTION OF RIVERSIDE COUNTY

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

NOTES:
[a] Attainment = Attainment or Unclassified, where Unclassified is treated the same as Attainment for regulatory purposes.
[b] Attainment status for the site area only, not the entire MDAB.
[c] Nitrogen dioxide attainment status for the new federal 1-hour NO_2 standard is scheduled to be determined by January 2012.

SOURCES: CEC RSA, 2010 (Air Quality Table 3); CEC Commission Decision, 2010 (Air Quality Table 2)

Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2004 through 2009 at the most representative monitoring stations for each pollutant, are shown in Table 3.2-3; and the 1-hour and 8-hour ozone, and 24-hour PM10 and PM2.5 data for the years 1999 through 2009 (2008 for PM10 and PM2.5), collectively “1998-2009 Historical Ozone and PM Air Quality Data,” are shown in Inset 3.2-1, below. Ozone data are from the Blythe-445 West Murphy Street monitoring station, PM10, PM2.5, NO_2, and CO data are from the Palm Springs Fire Station monitoring station, and SO_2 data are from the Victorville-14306 Park Avenue monitoring station.

3.2.2 Ozone

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted nitrogen oxides (NOx) and hydrocarbons (Volatile Organic Compounds [VOCs]) in the presence of sunlight. Pollutant

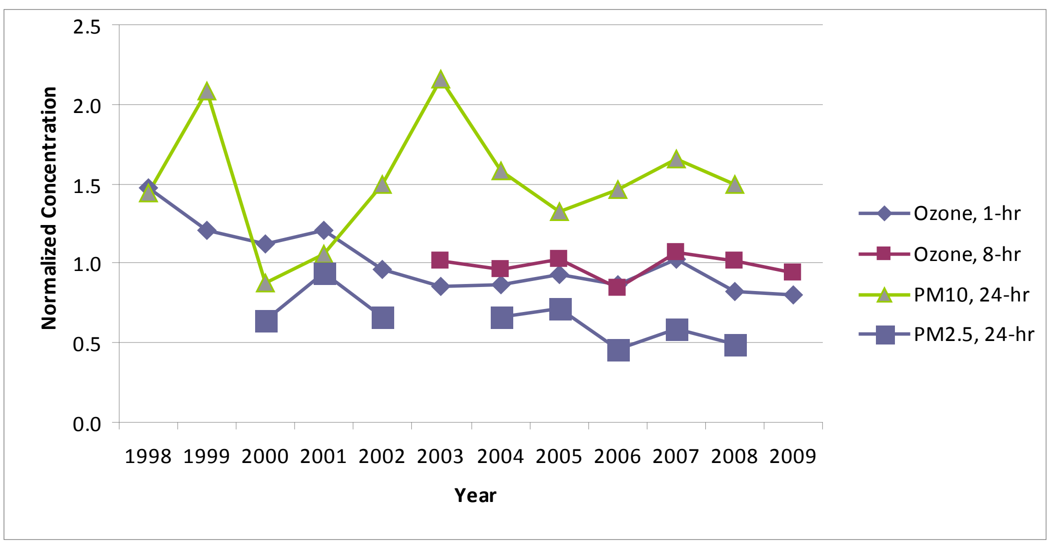
TABLE 3.2-3
CRITERIA POLLUTANT SUMMARY MAXIMUM AMBIENT CONCENTRATIONS (PPM OR µG/M^3)

Pollutant	Averaging Period	Units	2004	2005	2006	2007	2008	2009	Limiting AAQS[c]
Ozone	1 hour	ppm	0.078	0.084	0.078	0.092	0.074	0.072	0.09
Ozone	8 hours	ppm	0.067	0.072	0.059	0.075	0.071	0.066	0.07
PM10 [a,b]	24 hours	µg/m^3	79	66	73	83	75	--	50
PM10 [a,b]	Annual	µg/m^3	26.4	25.9	24.5	30.5	23.2	--	20
PM2.5 [a]	24 hours	µg/m^3	23.3	25	15.9	20.5	17.1	--	35
PM2.5 [a]	Annual	µg/m^3	9.0	8.4	7.7	8.7	7.2	--	12
CO	1 hour	ppm	2.1	2.1	2.3	1.5	1.3	2.3	20
CO	8 hours	ppm	0.8	0.8	0.85	0.79	0.54	0.67	9.0
NO_2	1 hour	ppm	0.066	0.059	0.093	0.063	0.049	0.048	0.18
NO_2	Annual	ppm	0.013	0.012	0.01	0.01	0.009	0.008	0.03
SO_2	1 hour	ppm	0.011	0.012	0.018	0.009	0.006	0.028	0.25
SO_2	3 hour	ppm	0.007	0.008	0.012	0.005	0.006	0.006	0.5
SO_2	24 hours	ppm	0.003	0.003	0.005	0.005	0.002	0.005	0.04
SO_2	Annual	ppm	0.0013	0.0013	0.0015	0.0013	0.0011	0.000	0.03

NOTES:
a Exceptional PM concentration events, such as those caused by wind storms are not shown where excluded by U.S.EPA; however, some exceptional events may still be included in the data presented.
b The PM10 data source is in the Coachella Valley that is classified as a serious PM10 nonattainment area.
c The limiting AAQS is the most stringent of the CAAQS or NAAQS for that pollutant and averaging period.

SOURCE: CEC RSA, 2010 (Table 4)

INSET 3.2-1
1998-2009 HISTORICAL OZONE AND PM AIR QUALITY DATA
BLYTHE AND PALM SPRINGS MONITORING STATIONS, RIVERSIDE COUNTY[a,b,c]



NOTES:

a The highest measured ambient concentrations of various criteria air contaminants were divided by their applicable standard and provided as a graphical point. Any point on the chart that is greater than one means that the measured concentrations of such air contaminant exceed the standard, and any point that is less than one means that the respective standard is not exceeded for that year. For example the 24-hour PM10 concentration in 2008 is 75 µg/m^3/50 µg/m^3 standard = 1.5.

b All ozone data are from Blythe–445 West Murphy Street monitoring station. 8-hr ozone data were not available for this station before 2003.

c All PM data are from Palm Springs monitoring station. 24-hr PM2.5 data were not available for this station before 2000 and between 2002 and 2004 and no PM data were available after 2008.

SOURCE: CEC RSA, 2010 (Figure 1)

transport from the Los Angeles area of the South Coast Air Basin is one source of the pollution experienced in the eastern Riverside County portion of the MDAB (SCAQMD 2007 as cited in the CEC RSA, 2010).

The 1-hour and 8-hour ozone concentrations measured at the eastern border of Riverside County have been very slowly decreasing over time. The collected air quality data (not shown) indicate that the ozone violations occurred primarily during the sunny and hot periods typical during May through September. The ozone concentrations in the project area have exceeded state ambient air quality standards.

High ozone concentrations can aggravate respiratory and cardiovascular diseases, irritate eyes, impair cardiopulmonary function, and cause leaf damage.

3.2.3 Nitrogen Dioxide

The entire MDAB is classified as attainment for the state 1-hour and annual and federal annual NO_2 standards. The nitrogen dioxide attainment standard could change due to the new federal 1-hour standard, although a review of the air basin-wide monitoring data suggest this would not occur for the MDAB.

Approximately 90 percent of the NOx emitted from combustion sources is nitric oxide (NO), while the balance is NO_2. NO is oxidized in the atmosphere to NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2 typically occur during the fall. The winter atmospheric conditions can trap emissions near the ground level, but lacking substantial photochemical activity (sun light), NO_2 levels are relatively low. In the summer the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions disperse pollutants, preventing the accumulation of NO_2. The NO_2 concentrations in the project area are well below the state and federal ambient air quality standards.

NO_2 can aggravate respiratory diseases, reduce visibility, reduce plant growth, and form acid rain.

3.2.4 Carbon Monoxide

MDAB is classified as attainment for the state and federal 1-hour and 8-hour CO standards. The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground level. These conditions occur frequently in the wintertime late in the afternoon, persist during the night and may extend one or two hours after sunrise. The project area has a lack of significant mobile source emissions and has CO concentrations that are well below the state and federal ambient air quality standards.

CO reduces tolerance from exercise can, cause impairment of mental function, cause impairment of fetal development, aggravate some heart dieses (angina), and cause death at high levels of exposure.

3.2.5 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.

MDAB is classified as non-attainment for state PM10 standards and unclassified for the federal PM10 standard. Table 3.2-3 and Inset 3.2-1 show recent PM10/PM2.5 concentrations. The figures show fluctuating concentrations patterns, and show clear exceedances of the state 24-hour PM10 standard. It should be noted that exceedance does not necessarily mean violation or nonattainment, as exceptional events do occur and some of those events, which do not count as violations, may be included in the data. The MDAB is designated as nonattainment for the state PM10 standard.

Fine particulate matter, or PM2.5, is derived mainly either from the combustion of materials, or from precursor gases (SOx, NOx, and VOC) through complex reactions in the atmosphere. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds.

The entire MDAB is classified as attainment for the federal standard and, in the project area, is designated unclassified for the state PM2.5 standards. This divergence in the PM10 and PM2.5 concentration levels and attainment status indicates that a substantial fraction of the ambient particulate matter levels are most likely due to localized fugitive dust sources, such as vehicle travel on unpaved roads, agricultural operations, or wind-blown dust.[1]

Particulate matter can aggravate respiratory diseases, can result in reduced lung function, it can increase cause and chest discomfort, causes reduced visibility.

3.2.6 Sulfur Dioxide

The entire air basin is classified as attainment for the state and federal SO_2 standards.

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

1 Fugitive dust, unlike combustion source particulate and secondary particulate, is composed of a much higher fraction of larger particles than smaller particles, so the PM2.5 fraction of fugitive dust is much smaller than the PM10 fraction. Therefore, when PM10 ambient concentrations are significantly higher than PM2.5 ambient concentrations this tends to indicate that a large proportion of the PM10 are from fugitive dust emission sources, rather than from combustion particulate or secondary particulate emission sources.

SO_2 can irritate the upper respiratory tract and be injurious to lung tissue causing reduced lung function, including asthma and emphysema. SO_2 can cause plant leaves to be yellow, and be destructive to metals, textiles, leather, finishes, and coatings. SO_2 can limit visibility.

3.3 Global Climate Change

3.3.1 Greenhouse Gases and Climate Change

Climate change refers to any significant change in measures of climate (temperature, precipitation, or wind) that lasts for an extended period (e.g., decades or longer). A number of factors may affect climate change, including: natural cycles (e.g., changes in the sun's intensity or earth's orbit around the sun): natural processes within the climate system (e.g., changes in ocean circulation); and human activities that lead to changes the atmosphere's composition (e.g., burning fossil fuels), land surface (e.g., deforestation, reforestation, urbanization, and desertification), and water bodies (oceanic acidification, sea level rise, and formation of dry lakes).

California is a substantial contributor to global GHG emissions as it is the second largest contributor in the U.S. and the 16th largest in the world (CEC Genesis RSA, 2010). GHGs include:

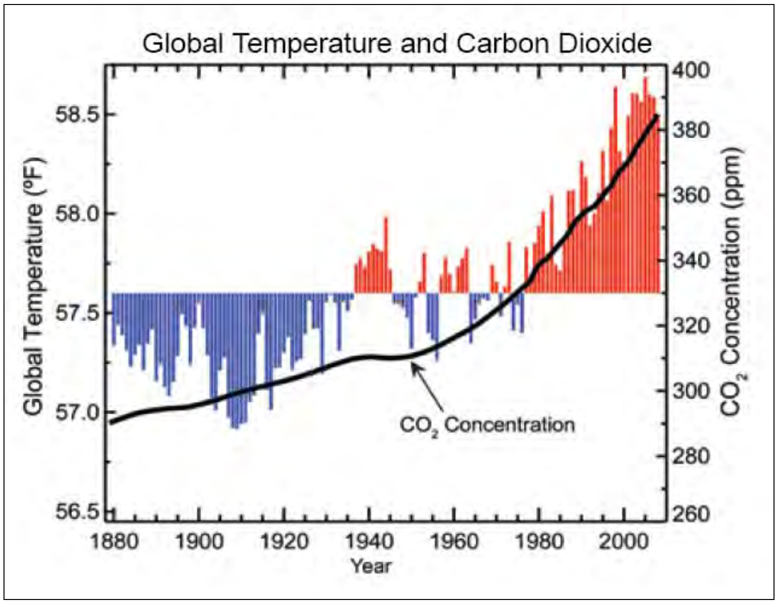
1. Carbon dioxide (CO2)
2. Methane (CH4)
3. Mono-nitrogen oxides (NOx)
4. Hydrofluorocarbons (HFCs)
5. Perfluorocarbons (PFCs)
6. Sulfur hexafluoride (SF6)

Electricity generation can produce GHGs comprised of the criteria air pollutants that traditionally have been regulated under the federal and state Clean Air Acts. For fossil fuel-fired power plants, the GHG emissions include primarily carbon dioxide, with much smaller amounts of nitrous oxide (N_2O), and methane (often from unburned natural gas). Other sources of GHG emissions include sulfur hexafluoride (SF_6) from high voltage equipment and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from carbon-based fuels. Other sources of GHG emissions are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very high global warming potentials.

According to the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report, increased atmospheric levels of CO_2 correlate with rising temperatures; concentrations of CO_2 have increased by 31 percent above pre-industrial levels since 1750 (Inset 3.3-1). Climate models show that temperatures will probably increase by 1.4 degrees Celsius (°C) to 5.8 °C between 1990 and 2100. Much uncertainty in this increase results from not knowing future CO_2 emissions and inherent uncertainty in the assumptions that frame climate models. The IPCC concluded in a statement released February 2, 2007, that "the widespread warming of the atmosphere and ocean, together with ice-mass loss, support the conclusion that it is extremely unlikely that global climate change of the past 50 years can be explained without external forcing, and very likely that it is not due to known natural causes alone" (IPCC, 2007).

GWP is a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming and is devised to enable comparison of the warming effects of different gases. It is a relative scale that compares the gas in question to that of the same mass of CO_2. CO_2 equivalence (CO_2e) is a measure used to compare the emissions from various GHGs based on

INSET 3.3-1
RELATIONSHIP BETWEEN
GLOBAL TEMPERATURE AND CARBON DIOXIDE (IPCCD 2007)



their GWP, when measured over a specified timescale (generally 100 years). CO_2e is commonly expressed as million metric tons (MMT) of carbon dioxide equivalents ($MMTCO_2e$). The CO_2e for a gas is obtained by multiplying the mass (in tons) by the GWP of the gas. For example, the GWP for CH_4 over 100 years is 25. This means that the emission of one MMT of CH_4 is equivalent to the emission of 25 MMT of CO_2, or 25 $MMTCO_2e$.

3.3.2 EPA Regulatory Initiatives on Greenhouse Gases

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the U.S. Supreme Court found that greenhouse gases (GHGs)[1] are air pollutants under the federal Clean Air Act. The Court held that the EPA must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. These decisions require the EPA to follow the language of Section 202(a) of the CAA. The Supreme Court decision resulted from a petition for rulemaking under Section 202(a) filed by more than a dozen environmental and renewable energy organizations and other entities (CEC RSA, 2010).

After a thorough examination of the scientific evidence on the causes and effects of current and future climate change, as well as other effects of GHGs, the EPA concluded that the science compellingly supports a positive endangerment finding for both public health and welfare. The EPA relied heavily upon the major findings and conclusions from recent assessments of the U.S. Climate Change Science Program and the Intergovernmental Panel on Climate Change. The

1 The terms greenhouse gases (GHG) and global climate change (GCC) gases are related. Global climate change is the result of GHGs, or air emissions with global warming potentials and affect the global energy balance, and the climate of the planet. GHGs inherently are a cumulative impacts issue, and are discussed as a cumulative impact in this EIS.

EPA made this endangerment finding after considering both observed and projected future effects of climate change, key uncertainties, and the full range of risks and effects to public health and welfare occurring within the United States (EPA, 2009d; EPA, 2009e; EPA, 2009f).

In response, the EPA issued a final rule on May 13, 2010 to apply Prevention of Significant Deterioration (PSD) requirements to new facilities whose carbon dioxide-equivalent emissions exceed 100,000 tons per year (EPA, 2010). The GHG emissions for the project are expected to fall below this amount. Moreover, GHG reductions will be realized from this project. Electrical power generated by the project would be accepted onto the power grid with priority over electrical power generated from fossil based power plants. Therefore, during operations when the PSPP is actively generating electricity, the project would effectively displace a portion of existing fossil fuel-based energy generation with renewable energy generation, and net GHG production would be reduced. See Section 4.3, *Impacts on Global Climate Change,* for GHG emissions and reductions associated with the proposed action and alternative actions.

In addition to the new PSD requirements, on September 22, 2009, the EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule. Under this rule, suppliers of fossil fuels or industrial GHG, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to the EPA. The gases covered by the proposed rule are carbon dioxide ($CO_{2)}$, methane ($CH_{4)}$, nitrogen dioxide (N_2O), hydrofluorocarbons (HFC)s, perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other fluorinated gases, including nitrogen trifluoride (NF_3)and hydrofluorinated ethers (HFEs) (CEC Genesis RSA, 2009). Thus, facilities classified as general stationary fuel combustion sources, including electricity services (North American Industry Classification System [NAICS] Code 221) must report emissions if annual rates equal or exceed 25,000 metric tons of GHG. However, the rule does not set specific reporting requirements for electric power generation from solar resources (NAICS Code 221119).

3.3.3 Other Federal and Major International Guidance on Greenhouse Gases and Climate Change

From the White House, Executive Order (EO) No. 13514 Federal Leadership in Environmental, Energy, and Economic Performance expands national efforts to reduce GHG emissions and establishes environmental performance requirements for Federal agencies identified in EO No. 13423 Federal Leadership in Environmental, Energy, and Economic Performance. EO No. 13514 integrates a strategy for sustainability into the Federal Government and makes reduction of GHG emissions a priority for Federal agencies.

From the Department of the Interior (DOI), Secretarial Orders 3226 (Climate Change and the Department of Interior, as amended) and 3285 (Renewable Energy Development by the Department of Interior) direct bureaus and offices within the Department to respond in a timely manner to climate change issues and make development of renewable energy a priority. On September 14, 2009, Secretary of the Interior, Ken Salazar, issued Order No. 3289(Addressing the Impacts of Climate Change on America’s Water, Land, and Other Natural and Cultural Resources). The Order establishes an approach for increasing understanding of climate change and responding to impacts related to climate change pertaining to tribes and to the natural and cultural resources that the DOI manages. The document specifically identifies potential impacts such as potential changes in flood risk and water supply, sea level rise, changes in wildlife and habitat populations and their migration patterns, new invasions of exotic species and increased threat of wildland fire. The Order includes Climate Change Response Planning Requirements, which require each bureau and office within the DOI (including the BLM) to consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multi-year management plans, and making major decisions regarding potential use of resources under the DOI's purview.

3.3.4 California State Guidance on Greenhouse Gases and Climate Change

The State of California has addressed global climate change, through regulatory and other actions taken by the California Energy Commission (CEC), the California Air Resources Board (CARB), the Legislature, and the Governor. For example, in 1998, the CEC 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 Genesis RSA, 2010). In 2003, the CEC recommended that the state require applicants to report GHG emissions as a condition of state licensing of new electric generating facilities (CEC Genesis RSA, 2010). In 2005, Governor Schwarzenegger issued Executive Order S-3-05, which established a goal of reducing GHG emissions 80 percent below 1990 levels by 2050.

In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). AB 32 mandates that the state report and verify its GHG emissions to document reduced GHG emissions statewide to 1990 levels by the year 2020. To facilitate this, CARB is required to adopt a statewide emissions limit, adopt regulations to reduce the amount of GHG emissions, and monitor compliance. CARB is the lead agency for implementing AB 32, which set the major milestones for establishing the program.

Although CO_2 is the largest contributor to climate change, AB 32 references five additional GHGs: CH_4, N_2O, SF_6, HFCs, and PFCs. Key elements of California's recommendations for reducing its GHG emissions to 1990 levels by 2020 include the following:

1. Setting targets for transportation-related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets;

2. Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard;

3. Imposing targeted fees on high global warming potential (GWP) gases;

4. Implementing additional measures to address emissions from industrial sources. These proposed measures would regulate fugitive emissions from oil and gas recovery and transmission activities; and

5. Imposing a high GWP mitigation fee to promote the development of alternatives to GWP chemicals and improve recycling and removal of these substances when older units containing them are dismantled.

In recognition of the critical role that local governments will play in the successful implementation of AB 32, CARB recommended a GHG reduction goal for local governments of 15 percent below current levels by 2020 to ensure that their municipal and community-wide emissions match the state's reduction target. AB 32 establishes a comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of GHGs. It also makes CARB responsible for monitoring and reducing GHG emissions and continues the existing Climate Action Team to coordinate statewide efforts. Additional requirements for CARB include the following:

1. Establishing a statewide GHG emissions cap for 2020 based on 1990 emissions;
2. Adopting mandatory reporting rules for significant sources of GHGs;
3. Adopting a plan that indicates how emission reductions would be achieved from significant GHG sources via regulations, market mechanisms, and other actions;
4. Adopting regulations to achieve the maximum technologically feasible and cost-effective reductions in GHGs, including provisions for using both market mechanisms and alternative compliance mechanisms;
5. Convening an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee to advise CARB;
6. Evaluating several factors prior to imposing any mandates or authorizing market mechanisms, including, but not limited to, impacts on California's economy, the environment, and public health; equity between regulated entities; electricity reliability and conformance with other environmental laws, as well as ensuring that the rules do not disproportionately impact low-income communities;
7. Adopting a list of discrete, early action measures to be implemented before January 1, 2010; and
8. Ensuring public notice and opportunity for comment on all CARB actions.

The CARB adopted early action GHG reduction measures in October 2007, mandatory reporting requirements and the 2020 statewide limit in December 2007,[2] and a Statewide scoping plan in December 2008 to identify how emission reductions will be achieved from major sources of GHG via regulations, market mechanisms, and other actions. CARB staff is developing regulatory language to implement its plan and holds ongoing public workshops on key elements of the recommended GHG reduction measures, including market mechanisms (See, e.g., CARB, 2010). The regulations must be effective by January 1, 2011 and mandatory compliance is to commence on January 1, 2012. The mandatory reporting requirements are effective for electric generating

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[2] The 1990 emissions level, and thus the 2020 emissions limit, adopted by ARB is 427 million metric tonnes of carbon dioxide equivalent (MMTCO2e).

facilities with a nameplate capacity equal or greater than 1 megawatt (MW) if their emissions exceed 2,500 metric tons (MT) per year.

In addition, the Climate Change Scoping Plan, the state's roadmap to reaching GHG reduction goals, considers the following key strategies[3]:

1. **Cap-and-Trade Program:** Broad-based to provide a firm limit on emissions; covers 85 percent of California's emissions: electricity generation, large industrial sources, transportation fuels, and residential and commercial use of natural gas, and provides regional linkage with the Western Climate Initiative, allowing greater environmental and economic benefits.

2. **Transportation:** GHG emission standards for cars, low-carbon fuel standard (10 percent by 2020), better land-use planning (Senate Bill 375), and more efficient delivery trucks, heavy-duty trucks, and goods movement.

3. **Electricity and Energy (imported included):** Improved appliance efficiency standards and other aggressive energy efficiency measures, 33 percent renewables by 2020, increased use of efficient "combined heat and power", million solar roofs, solar hot water heating, green buildings, and water efficiency.

4. **Industry (including cement):** Audit of the 800 largest emission sources in California to identify GHG reduction opportunities; regulations on refinery flaring and fugitive emissions; considerations for cement to address "leakage."

5. **High GWP Gases:** Capture refrigerants and other high GWP gases already in use; reduce future impact through leak-resistant equipment, restrictions on use, and fees.

6. **Forestry:** Preserve forest sequestration and voluntary reductions possible from forestry projects.

7. **Agriculture:** More efficient agricultural equipment, fuel use, and water use through transportation and energy measures; reductions from manure digesters; fewer impacts on productivity of crops and livestock.

8. **Waste and Recycling:** Reduce CH_4 emissions from landfills and move toward high recycling and zero waste.

Also in 2006, the State enacted SB 1368 (Public Utilities Code Section 8340 *et seq*.), which limits California utilities' long-term investments in base load[4] generation to power plants that meet an emissions performance standard (EPS) of 0.500 MT CO_2 per megawatt-hour (1,100 pounds CO_2/MWh). The EPS applies only to carbon dioxide; it does not apply to emissions of other GHGs converted to carbon dioxide equivalent. The Energy Commission and the California Public Utilities Commission (CPUC) jointly established the EPS, which applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with

[3] The status of the Climate Change Scoping Plan is currently under question as a result of a Superior Court decision in *Association of Irritated Residents, et al. v. California Air Resources Board* (January 24, 2010). Herein, the court enjoined implementation of the plan because the CARB had adopted it without compliance with CEQA. Additional appeal by the CARB is anticipated.

[4] *Base load* units are defined as units that operate at a capacity factor higher than 60 percent.

terms of five years or more, including contracts with power plants located outside of California.[5] If a project, in-State or out-of-State, plans to sell base load electricity to a California utility, the utility will have to demonstrate that the project meets the EPS. As a renewable electricity generating facility, the project is determined by rule to be compliant with the SB 1368 EPS.[6]

South Coast Air Quality Management District

The South Coast Air Quality Management District (SCAQMD) adopted, in December, 2008, its *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules, and Plans* (Interim Threshold), in order to provide a structure for determining level of impact significance for proposed projects that would result in GHG emissions. The Interim Threshold includes a policy objective to capture 90% of district-wide GHG emissions from industrial sources, and indicates a GHG emissions threshold of 10,000 megatons CO_2e/yr including construction emissions amortized over 30 years, as a significance threshold for GHG emissions (SCAQMD, 2008). Following adoption of the Interim Threshold, additional meetings of the working group charged with producing the Interim Threshold have been ongoing. At the time of publication for this report, finalized threshold values had not yet been adopted by the SCAQMD.

3.3.5 Potential Effects of Climate Change

In November 2004, the California Climate Action Team (CAT) was formed, comprising 14 agencies and 11 subgroups to assist CARB with the Climate Change Scoping Plan. According to the 2006 California CAT Report, the following climate change effects, based on the IPCC trends, can be expected in California over the next century:

1. Increasing temperatures from 0.5 °F to 5.8 °F under the higher emission scenarios, leading to a 25 percent to 35 percent increase in the number of days ozone pollution levels are exceeded in most urban areas;
2. Increased electricity demand, particularly in the hot summer months.
3. Increased vulnerability of forests due to pest infestation and increased temperatures; and
4. A diminishing Sierra snowpack, declining by 70 to 90 percent, threatening the State's water supply;

In addition to these anticipated trends, several additional potential effects of climate change have been identified in recent literature, that are potentially relevant to the project. These include:

1. Changes in flooding regimes and drought, potentially including more frequent extreme weather conditions, such as floods and droughts;
2. Changes in weather patterns that could result in altered drainage patterns and/or increases in erosion and sedimentation;
3. Changes in the availability of water resources to support beneficial use;

5 CPUC 2007
6 See Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2903(b)(1).

4. Changes in the distribution of biological species and/or habitats;

5. Increases in wildfire risk and heat waves, which could affect worker safety; and

6. Changes in soil moisture content, including potential for increases in fugitive dust emissions.

Potential effects of climate change, as specifically relevant to the project site and/or its vicinity, are discussed in Section 4.3, *Impacts on Global Climate Change*.

3.3.6 Existing Greenhouse Gas Emissions

Statewide GHG Emission Inventory

Statewide emissions of GHG from relevant source categories in 1990 and later years are summarized in Table 3.3-1. Specific contributions from air basins such as the Mojave Desert Air Basin (MDAB) are not currently specified as part of the State inventory. Emissions of CO_2 occur largely from combustion of fossil fuels. The major categories of fossil fuel combustion CO_2 sources can be broken into sectors for residential, commercial, industrial, transportation, and electricity generation. Other GHG emissions, such as CH_4 and N_2O, are also tracked by State inventories but occur in much smaller quantities.

TABLE 3.3-1
CALIFORNIA GREENHOUSE GAS EMISSIONS (MMTCO$_2$E)

Emission Inventory Category	1990	2000	2001	2002	2003	2004	2005
Residential Fuel Combustion (CO_2)	29.7	30.25	27.21	27.32	26.40	27.86	--
Commercial Fuel Combustion (CO_2)	14.4	15.63	12.04	17.84	15.06	12.1	--
Industrial Fuel Combustion (CO_2)	103.0	76.17	80.48	71.53	65.47	67.2	--
Transportation Fuel Combustion (CO_2)	150.7	181.68	182.49	190.19	180.64	187.95	--
Electricity Generation, in-State (CO_2)	49.0	55.87	61.35	47.78	45.92	55.10	49.0
Methane (all CH_4 shown as CO_2e)	--	26.32	26.62	27.07	27.49	27.80	--
Nitrous Oxide (all N_2O shown as CO_2e)	--	31.43	30.76	34.48	33.85	33.34	--
Electricity Transmission and Distribution (SF_6 shown as CO_2e)	2.6	1.14	1.10	1.04	1.01	1.02	--
Total California GHG Emissions without Electricity Imports	**371.1**	**440.47**	**446.35**	**444.86**	**423.20**	439.19	--
Electricity Imports (CO_2e)	61.6	40.48	47.37	51.73	56.44	60.81	--
Total California GHG Emissions with Electricity Imports	**433.29**	**480.94**	**493.72**	**496.59**	**479.64**	500.00	--

SOURCE: CEC Genesis RSA, 2010

3.3.7 Existing GHG Emissions Occurring at the Project Site

No industrial, residential, or other emitters of carbon dioxide are currently located or operating at the project site. There are no other existing on-site operations that result in the combustion of fossil fuel, or otherwise result in direct anthropogenic emissions of carbon dioxide on site. There is, however, existing vegetation located on site, and this vegetation is expected to provide ongoing natural carbon uptake. Wohlfahrt et al (2008 as cited in the CEC RSA, 2010) completed an evaluation of carbon uptake by natural vegetation in Mojave Desert systems. The study indicates that desert plant communities may result in the uptake of carbon in amounts as high as 100 grams per square meter per year. This would equate to a natural carbon uptake, under existing conditions, of approximately 1.48 MT of CO2 per acre per year. For an evaluation of potential impacts of the project on natural carbon uptake, refer to Section 4.3, *Impacts on Global Climate Change*.

3.4 Cultural Resources

Cultural resources are categorized as buildings, sites, structures, objects, and districts for the purposes of complying with the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). Three kinds of cultural resources are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are associated with human occupation and use prior to sustained European contact. 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 archaeological districts and as cultural landscapes. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans permanently settled in California.

Ethnographic resources represent the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, Latino, or Asian immigrants. They may include traditional resource-collecting areas, ceremonial sites, value-imbued landscape features, cemeteries, shrines, or ethnic neighborhoods and structures.

Historic-period resources, both archaeological and architectural, are associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Groupings of historic-period resources are also recognized as historic districts and as cultural vernacular landscapes.

Under federal and state historic preservation law, cultural resources generally must be at least 50 years old to have sufficient historical importance to merit consideration of eligibility for listing in the National Register of Historic Places (NRHP) or in the California Register of Historical Resources (CRHR). A resource less than 50 years of age must be of exceptional historical importance to be considered for listing.

3.4.1 Environmental Setting

Geology

The following discussion is primarily excerpted from Steinkamp (2009 as cited in the CEC RSA, 2010). The project site is located within the geomorphic province known as the Basin and Range, situated in the Chuckwalla Valley between the Chuckwalla Mountains to the south and the Palen and Coxcomb mountains to the north (Jennings 1967as cited in the CEC RSA, 2010). The underlying geology consists of Quaternary alluvial, eolian, and lakebed deposits ranging from Pleistocene (1.8 million years old) to Holocene (8,000 BC to Recent) in age.

Portions of the proposed substation and transmission line route are underlain by Quaternary intermediate alluvium, estimated to be 200,000 and 2,000 years old, consisting variously of gravel, sand, and silt, being situated on top of inactive older alluvial fan surfaces (Stone and Pelka

1989 as cited in the CEC RSA, 2010). The bulk of the project area is comprised of Quaternary younger alluvium, locally dated as AD 1 to present (Stone and Pelka 1989 as cited in the CEC RSA, 2010), composed of silt, sand, and gravel derived from the surrounding mountains.

In contrast, the northeastern portion of the proposed site is blanketed with surficial Quaternary lake bed deposits underlain by both eolian deposits and younger alluvium. These lake bed deposits are weakly consolidated to slightly dissected and in part overlain by modern playa deposits consisting of partly gypsiferous silt and clay (Jennings 1967; Stone and Pelka 1989 as cited in the CEC RSA, 2010). Active sand dunes and sand sheets of recent age also occur in the northeastern portion of the project area (Jennings 1967; Stone and Pelka 1989 as cited in the CEC RSA, 2010). The transition zone between lake bed and dune field is a mix of strongly deflated areas, interspersed with hummocky, linear, dome, and blowout dunes.

From southwest to northeast, the geomorphic landscape consists of a broad bajada (a coalescing of neighboring alluvial fans into a single apron of deposits) with parallel drainages of parallel rills, gullies, and washes that flow northeast toward a dune field in the northeast corner of the project area, bordering Palen Dry Lake bed.

Geoarchaeological Investigations

Geoarchaeological monitoring of a geotechnical investigation within the project site took place July 20–28, 2009 (Steinkamp 2009 as cited in the CEC RSA, 2010). Excavations of 12 boreholes and eight test pits were observed for presence/ absence of paleosols, archaeological artifacts, or other evidence of archaeological deposition. Stratigraphic samples were collected for sedimentological and mineralogical data. Test pits, 1.5–3 meters deep, were placed in locations where deep footings or weight-bearing loads are planned. No cultural resources were found, and no evidence of subsurface paleosols or cultural deposits was noted during the course of monitoring.

Observations of the surface topography and subsurface deposits from the test pits suggest that the site is dominated by a roughly 10–33-centimeter-thick veneer of soil (A horizon)[1] formed in fluvial (re-worked alluvial fan deposits) and eolian (wind-deposited) sands and fluvial gravels originating from the Pleistocene alluvial fans of the surrounding mountain slopes. A-horizon soils consist of olive gray gravelly sand with sparse roots, subangular pebbles, angular blocky structure, and a clear wavy boundary. The C-horizon consists of a C1 horizon of storm couplets overlaying a C2 and C3 horizon of alluvial and dune sands, as well as alluvial gravels. Data from the borings indicate that the deeper subsurface deposits, below three meters, consist of alluvial fan sand and gravels that appear to represent alluvial fan transgression and aggradation, and clay that likely correlates to transgression of early lacustrine (lake) deposits during glacial periods and stable phases of the coalescing alluvial fans.

On the basis of these observations, Steinkamp concludes that the potential for buried shallow archaeological deposits is highest within the northeast quadrant of the project site, where wave-

1 Sedimentologists denote successively deeper soil layers with alphabetical letters, starting at the top with “A.”

cut platforms of paleo-lacustrine and beach deposits were observed beneath dune deposits less than a meter below the surface. Within the remainder of the area, if buried deposits are present, they are more likely to be deeper (up to 20 feet), due to the greater depth of alluvial fan deposition. Archaeological deposits at depth, within the alluvial fan deposits, have the potential to be heavily disturbed by millennia of alluvial fan transgression and erosion processes. Over the last 80 years, however, dikes, constructed on the upslope side of U.S. Route 60/70 in the 1930s, have protected this area by diverting storm water runoff (Steinkamp 2009, pp. 16–18 as cited in the CEC RSA, 2010).

Paleoclimate and Paleoenvironment

Information on paleoclimate and paleoenvironment for the southern Mojave and northern Sonoran (Colorado) deserts are derived from plant macrofossils found in packrat middens (Grayson 1993, pp. 119–128; 139–143; 194–195; 199–202, 215; Spaulding 1990; Tausch et al. 2004; Thompson 1990; Wigand and Rhode 2002, pp. 332–342; Cole 1986; Van Devender 1990; West et al. 2007, pp. 32–33 as cited in the CEC RSA, 2010), and stratigraphic studies of playa and dry lake deposits years (Ezzo et al. 1989, 1992 as cited in the CEC RSA, 2010).

The geologic epoch following the ice age, or Pleistocene, the Holocene, in which humans are known to have occupied North America, began approximately 12,000 years ago. For purposes of this discussion, the Holocene is divided into four periods: Early, Middle, Early Late, and Late Late.

Early Holocene (10,000-6000 BC)

During the Late Pleistocene and Early Holocene, as the climate became warmer and drier, extensive lowland conifer woodlands retreated upslope and were replaced by desert scrub associations. In the northern Sonoran Desert, around 9,500 BC, hot desert plants (pigmy cedar, cat claw acacia) began dispersing into the region. From about 8,400 BC on, creosote bush begins to appear. This warmer drier period, however, is also noted for witnessing episodes of greater precipitation. In the Mojave Desert, three high lake-stands have been identified at Silver Lake playa, dating between 13,000 and 7,300 BC (Ezzo et al. 1989 as cited in the CEC RSA, 2010). Gallegos et al. (1980, p. 93 as cited in the CEC RSA, 2010) postulate that two moister climatic intervals, dating between 10,500 and 9,500 BC, occurred, based on a pair of caliche beds near Cadiz Dry Lake that were found to contain traces of human stone tool use.

Middle Holocene (6000-3500 BC)

The subsequent Middle Holocene was the warmest and driest interval of the entire Holocene. Desert shrub vegetation dominated lowland and mid-level elevation localities. White burrobush and creosote bush increased in abundance. A dearth of vegetation data from the Middle Holocene suggests plant cover was probably very sparse as a consequence of severe drought conditions. Between approximately 4,800 and 3,000 BC, little evidence exists for summer rainfall. Gallegos et al. (1980, p. 93 as cited in the CEC RSA, 2010) postulate that a climatic interval, dating around

6,500 to 6,000 BC, probably resulted in lake filling based on the discovery of a site of that age, found in the fossil dunes near Bristol Dry Lake.

Early Late Holocene (3500 BC–AD 1)

The Early Late Holocene has been characterized as a period of relatively warm and dry conditions (sometimes drought) interspersed with evidence of cooler moister regimes. For example, evidence of peat deposits, dating to 3,000 BC, has been found at various spring localities in the Mojave Desert. Similarly, around 1,800 BC, a significant increase in the density of pinyon-juniper woodland took place in southern Nevada, suggesting cooler temperatures and winter-dominant precipitation. In the Mojave Desert, a high lake-stand at Silver Lake playa occurred approximately 1,620 BC (Ezzo et al. 1989, 1992 as cited in the CEC RSA, 2010). Gallegos et al. (1980, p. 93 as cited in the CEC RSA, 2010) postulate that a climatic interval, about 1,000 BC, probably resulted in lake filling again, based on evidence of shoreline camping at Cadiz Dry Lake.

Late Late Holocene (AD 1–present)

During the Late Late Holocene, temperature and precipitation patterns fluctuated significantly, swinging between periods of drought and relatively warm conditions (Meko et al. 2001; Stine 1994, 1996, 1998, 2000 as cited in the CEC RSA, 2010), with periods of summer-dominant precipitation and milder winters, contrasting with periods of cooler and somewhat drier conditions and increased winter-dominant precipitation, reminiscent of the previous epoch’s ice age (Fagan 2000; Grove 1988; Meko et al. 2001; Scuderi 1987a, 1987b, 1990, 1993 as cited in the CEC RSA, 2010). Modern conditions have prevailed over the last 200 years, with increases in the distribution of pinyon pine, at the higher altitudes as well as expansion of saltbush and the creosote bush/white burrobush associations in the desert lowlands.

Gallegos et al. (1980, p. 93 as cited in the CEC RSA, 2010) postulate that a few hundred years ago, during the “Little Ice Age,” rains would have maintained a marshy shallow lake in the Palen basin, supporting subsistence resources favorable for lakeshore hunting and gathering. This is based on hunting and processing tools, as well as red/buff pottery found in fossil dunes at the northwest end of the lake (Gallegos et al. 1980, p. 103 as cited in the CEC RSA, 2010). Large areas of residual sediments stand as “witness columns” and eroding plateaus, 1–2 meters higher than the present lakebed, indicating the former presence of an older lake. Rich archaeological deposits, mixed with lag gravel, are exposed near the base of Palen’s eroding dunes (Gallegos et al. 1980, p. 106 as cited in the CEC RSA, 2010).

Prehistoric Background

During the 1970s, the BLM undertook a large-scale cultural resources inventory of the Central Mojave and Colorado Desert Regions (Gallegos et al. 1980 as cited in the CEC RSA, 2010). Crabtree (1980 as cited in the CEC RSA, 2010), in an overview of the region, subsequently summarized the history of archaeological study, identified the cultural chronology and common site types observed, and outlined the research topics of interest at that time. Subsequent cultural resources management investigations have contributed additional information to help refine our understanding of the prehistory of this region (Arnold et al. 2002, pp. 46–48; Love and Dahdul 2002; Schaefer 1994; Schaefer and Laylander 2007; Warren 1984, pp. 403–409 as cited in the CEC RSA, 2010).

An initial cultural chronology-culture history scheme for the Colorado Desert was developed in the 1930s and 1940s (Campbell 1931, 1936; Campbell and Campbell 1935; Campbell et al. 1937; Rogers 1939, 1945 as cited in the CEC RSA, 2010). This scheme has formed the foundation for subsequent efforts, most recently expressed by Sutton et al. (2007, pp. 233–243; table 15.4 as cited in the CEC RSA, 2010), relating the temporal periods and complexes delineated to those found in the Mojave Desert.

Paleo-Indian Period (about 10,000–8,000 BC)

The Paleoindian Period occurred during the late Pleistocene and the first half of the Early Holocene. Isolated fluted projectile points, assignable to the Western Clovis Tradition have been recovered from the Pinto Basin, Ocotillo Wells, Cuyamaca Pass, and the Yuha Desert (Dillon 2002, p. 113; Moratto 1984, p. 77, fig. 3.1; 87; Rondeau et al. 2007, pp. 64–65, fig. 5.1, table 5.1 as cited in the CEC RSA, 2010). All are surface finds, and have no associations with extinct fauna.

Lake Mojave Complex (8,000–6,000 BC)

The Lake Mojave complex, also known as the Western Pluvial Lakes/Western Stemmed Tradition (Beck and Jones 1997; Erlandson et al. 2007; papers in Graf and Schmitt 2007; Schaefer 1994, pp. 63–64; Sutton et al. 2007; papers in Willig et al. 1988 as cited in the CEC RSA, 2010), occurred during the second half of the Early Holocene. It is characterized by Great Basin Stemmed Series projectile points (Lake Mojave and Silver Lake types), abundant bifaces, steep-edged unifaces, crescents, and occasional cobble tools and ground stone tools. These artifacts often occur in undated surface contexts. Assemblage composition and site structure suggest highly mobile foragers, often traveling considerable distances. Little reliance upon vegetal resources is evidenced. The value of wetland habitats remains unclear. Lake Mojave lifeways may result from relatively rapidly changing climate and habitats during the Early Holocene. This would have produced unpredictability in resource distribution and abundance, producing a high degree of residential mobility.

Pinto Complex (8,000–3,000 BC)

The Pinto complex spans portions of the Early and Middle Holocene. Toolstone use, based on sites attributed to this complex, focuses upon materials other than obsidian and cryptocrystalline silicate (CCS). Pinto Series points are stemmed with indented bases, and display high levels of reworking. Bifacial and unifacial cores/tools are common. Ground stone tools are moderately to very abundant, indicating greatly increased use of plant resources. Pinto sites occur in a broad range of topographic and environmental settings, especially within remnant pluvial lake basins. Moderate to large numbers of people, practicing a collector subsistence strategy, occupied large residential base camps for prolonged periods. Logistical forays into surrounding resource patches probably were made from these sites.

Deadman Lake Complex (7,500–5,200 BC)

Currently, the Deadman Lake complex appears at this time to be confined to the Twentynine Palms area. Sites usually are surficial and located on old alluvial pediments. Artifacts include small-to-medium-size contracting stemmed or lozenge-shaped points, large concentrations of battered cobbles and core tools, and abundant bifaces, simple flake tools, and ground stone tools. The abundance of cobble tools suggests an emphasis upon plant processing. The Deadman Lake and Pinto complexes may represent two different human populations practicing different seasonal/annual rounds, or Deadman Lake may represent a component of the overall Pinto complex adaptation.

Possible Abandonment (3,000–2,000 BC)

Beginning roughly at this time, conditions in the Mojave Desert were warmer and drier. Few archaeological sites date to this period. This suggests population densities were very low. It is possible some areas were largely abandoned. This period corresponds in part to the latter part of the proposed "Altithermal Abandonment," recognized by some prehistorians as characterizing portions of the Great Basin (see Kelly 1997, pp. 8–9 as cited in the CEC RSA, 2010).

Gypsum Complex (2,000 BC–AD 200)

The Gypsum complex, spanning most of the Early Late Holocene, is characterized by the presence of corner-notched Elko Series points, concave-base Humboldt Series points, and well-shouldered contracting-stemmed Gypsum Series points. Numerous bifaces also occur. Manos and metates are relatively common. During the early portion of the Gypsum complex, settlement-subsistence appears focused near streams. At this time, increased trade and social complexity apparently occurred. Gypsum components are smaller, more abundant, and occur over a more diverse suite of settings than those dating previously. Evidence for ritual activities includes quartz crystals, paint, split-twig animal figurines, and rock art. Gypsum Complex sites are uncommon in the southern and eastern Mojave Desert.

Rose Spring Complex (AD 200–AD 1000)

Cultural systems profoundly changed in the southern California deserts during the Late Late Holocene with the introduction of the bow and arrow, represented by Rosegate Series points. During this time, a major increase in population is thought to have occurred, possibly resulting from a more productive environment and a more efficient hunting technology. Sites often are located near springs, along washes, and sometimes along lakeshores. Intensive occupation is indicated by the presence of wickiups, pit houses, and other types of structures. Well-developed middens have yielded artifact assemblages containing knives, drills, pipes, bone awls, various ground stone tools, marine shell ornaments, and large amounts of obsidian. Obsidian procurement and processing apparently significantly structured settlement-subsistence.

Late Prehistoric Period (AD 1000–AD 1700)

During the Late Prehistoric period, horticultural practices and pottery were introduced (most likely from the Hohokam area in southern Arizona or from northern Mexico), having its greatest impact along the Lower Colorado River (McGuire and Schiffer 1982; Schaefer 1994, pp. 65–74; Schaefer and Laylander 2007, pp. 253–254 as cited in the CEC RSA, 2010). Ceramic artifacts began to appear in the Colorado Desert approximately AD 1000, assigned to the Lowland Patayan (Lower Colorado Buff Ware) and Tizon Brown Ware traditions (Lyneis 1988; Waters 1982 as cited in the CEC RSA, 2010).

A complex cultural landscape composed of rock art, trails, and geoglyphs[2] developed during the Late Prehistoric period. Trade and exchange were elaborated, with an emphasis on links between coastal southern California and the Southwest. In addition to pottery, artifact assemblages include Desert Series projectile points, shell and steatite beads, and a variety of milling tools. Obsidian use declined significantly, with CCS becoming the dominant toolstone.

Prehistory of the Chuckwalla Valley

Singer (1984 as cited in the CEC RSA, 2010) presents a lithic quarry-oriented prehistoric settlement model for the Chuckwalla Valley and environs. Over 200 prehistoric sites occur in the region. Past peoples inhabiting the area appear to have been very mobile, especially during late prehistoric and early historic times. During early historic times, native peoples inhabited towns/hamlets located along the Colorado River, within the Coachella Valley, and at major desert springs/oases.

The Chuckwalla Valley was a relatively closed resource exploitation zone. It served as an east-west oriented trade route/corridor between the Pacific Ocean and the Colorado River/greater Southwest. An extensive network of trails is present within the Chuckwalla Valley. Given its orientation and location, the valley may have been neutral territory (i.e., a buffer zone), unclaimed by neighboring native peoples. Quarry sites probably were “owned” by tribal groups. The distribution of particular types of toolstones may have corresponded to a group’s territorial boundaries, and a toolstone type may not have occurred beyond the limits of a group’s specific territory.

Within the Chuckwalla Valley, prehistoric sites are clustered around springs, wells, and other obvious important features/resources. Sites include villages with cemeteries, occupation sites with and without pottery, large and small concentrations of ceramic sherds and flaked stone tools, rock art sites, rock shelters with perishable items, rock rings/stone circles, geoglyphs (see Geoglyphs, below), and cleared areas, a vast network of trails, markers and shrines, and quarry sites. Possible village locations are present at Palen Lake, Granite Well, and Hayfield Canyon.

A cluster of temporary habitation and special activity (task) sites occurs around a quarry workshop in the Chuckwalla Valley. The Chuckwalla Valley aplite quarry workshop complex probably was used throughout the Holocene. During this period, Chuckwalla Valley most likely was occupied, abandoned, and reoccupied by a succession of ethnic groups. In the Early

2 Geoglyphs, also known as intaglios, were created on desert pavements by rearranging and/or clearing pebbles and rocks to form alignments, clearings, and/or figures. Rock alignments are present throughout this region, while representational figures only occur close to the Lower Colorado River. It is assumed that they played some role in sacred or ritual activities for prehistoric Native Americans.

Holocene (i.e., Lake Mojave complex times), the area may have been relatively densely inhabited. During the Middle Holocene (i.e., Pinto and Gypsum complexes period) it may only have been sporadically visited. The subsequent Late Holocene Rose Spring and Late Prehistoric periods probably witnessed reoccupation of the valley by Yuman and Numic-speaking peoples.

Research Topics

The research topics discussed below include lithic (stone) procurement, ceramic traditions, horticulture, trade and exchange, and cultural landscapes.

Lithic Procurement

The geology of the Colorado Desert provided prehistoric peoples with a variety of lithic materials for artifact production (Schaefer and Laylander 2007, pp. 252–253 as cited in the CEC RSA, 2010). These included obsidian, cryptocrystalline silicates (chert), crystalline volcanics (basalt, rhyolite), quartz, and plutonic, metamorphic, and sedimentary rocks.

Coso obsidian was the dominant source of obsidian used by Colorado Desert peoples prior to AD 1000. Other obsidian sources, from the southern Mojave Desert, include Bristol Mountains and Devil Peak (Shackley 1995 as cited in the CEC RSA, 2010). Approximately a dozen sources located in Baja California, extreme northwest Sonora, and western Arizona may also have been used (Shackley 1988, 1995, 2005 as cited in the CEC RSA, 2010). During the last thousand years, however, Obsidian Butte was the principal obsidian used in the Colorado Desert and coastal southern California (Hughes 1986; Hughes and True 1983; Laylander and Christenson1988; Schaefer and Laylander 2007, p. 251 as cited in the CEC RSA, 2010). Obsidian Butte, located near the southern edge of the Salton Sea, was inaccessible when Lake Cahuilla rose to inundate it (130 feet below sea level).

Several topics relating to prehistoric quarrying and tool manufacturing/use have been identified, including: distinction between formal versus the expedient procurement of lithics (Wilke and Schroth 1989 as cited in the CEC RSA, 2010); lithic reduction strategies and transport of lithic materials (Bamforth 1990, 1992 as cited in the CEC RSA, 2010); scales of production at quarries where lithic materials were procured to manufacture ground stone tools (Schneider et al. 1995 as cited in the CEC RSA, 2010); and differences in tools/lithic tools by gender (Walsh 2000 as cited in the CEC RSA, 2010).

Bamforth (1990, 1992 as cited in the CEC RSA, 2010) considers Holocene settlement, raw material, and lithic procurement at several quarry sites in the central Mojave Desert. He suggests that quarry use was conditioned upon mobility strategies, regional quality and abundance of lithic materials, as well as quarry location. Bamforth suggests that an emphasis on transporting prepared cores during the period 2000 BC–AD 500 may have resulted from the formation of relatively large and stable communities in areas with concentrated plant resources.

Singer (1984 as cited in the CEC RSA, 2010) studied two quarry workshop sites located in Chuckwalla Valley. Core production and reduction from locally available aplite was emphasized. This yielded flakes and bifaces, which appear to have been exported from the quarries for final reduction at other sites. Few formed tools were observed. Those that were present were choppers and scrapers, possibly used to manufacture wooden digging or prying sticks and shafts. The quarry sites appeared to have experienced long-term occupation and use.

Manufacturing efforts appear to have been directed towards production of expedient, rapidly discarded cutting/scraping/pounding/milling tools from locally available lithics (Ludwig 2005; Schaefer and Laylander 2007, pp. 252–252; Singer 1984 as cited in the CEC RSA, 2010). Specialized tool manufacturing included production of sandstone metates along the western side of the Colorado Desert, projectile point (arrow) workshops at seasonal task sites situated around playas, and large quarries at volcanic outcrops within the Lower Colorado and Gila River Valleys, where mortars and pestles were made (Schaefer and Laylander 2007, p. 252 as cited in the CEC RSA, 2010).

Ceramic Traditions

Schaefer and Laylander (2007, pp. 252–253 as cited in the CEC RSA, 2010) note that buffware pottery occurring within the Colorado Desert was initially assigned to the Hakataya ceramic series (Schroeder 1958, 1979 as cited in the CEC RSA, 2010). Subsequent studies (Waters 1982 as cited in the CEC RSA, 2010) place it within the Lowland Patayan Ceramic Tradition. Both typologies are based on surface collections of sherds, with little data resulting from stratigraphic excavations, or associated radiocarbon dates. Schroeder focuses upon details of temper, inclusions, and surface treatment, while Waters emphasizes rim form. Both attempt to define geographic limits of production for each type. Difficulties in applying typology, and problems with stratigraphic integrity, archaeological contexts, and anomalous associated radiocarbon dates, have allowed only gross chronological estimates and have limited identification of manufacturing regions.

In the Salton Basin, some sites dating between about AD 350 and AD 1200 contain pottery (Love and Dahdul 2002 as cited in the CEC RSA, 2010). This evidence suggests pottery was not introduced or rarely used prior to about 1000 AD. Earlier dates from the preceding 200 years suggest Lake Cahuilla may have attracted Colorado River peoples (and their pottery). Early ceramic dates from the Colorado Desert correspond closely with the inception of widespread use of Tizon Brownware pottery in the Peninsular Ranges and along the Pacific Coast (Lyneis 1988; Griset 1996 as cited in the CEC RSA, 2010), although some dates suggest initial introduction of ceramics by AD 800, if not before.

Viewed regionally, pottery use within the Late Prehistoric of the Colorado Desert can be divided into three periods (Arnold et al. 2002, pp. 46–47; Love and Dahdul 2002, pp. 72–73; Waters 1982 as cited in the CEC RSA, 2010). Patayan I times, about AD 800–AD 1050, witnessed the inception of several ceramic traditions. During Patayan II times, AD 1050–AD 1500, increased local manufacture and use of pottery occurred. Patayan III, AD 1500–AD 1760, saw the introduction of “Colorado Buff” pottery, and the westerly spread of ceramics to coastal southern California.

With respect to social and cultural factors governing pottery adoption and use within the Colorado Desert, recent analyses of pottery from the Mojave Desert and surrounding areas provide models focused on behavioral implications regarding its manufacture and function. One concern has been with determining if ceramic vessels were locally made (Eerkens 2001; Eerkens et al. 1999, 2002a; Griset 1996 as cited in the CEC RSA, 2010). Neutron activation analysis and petrographic studies have been used to identify chemical and material signatures (Eerkens et al. 2002b as cited in the CEC RSA, 2010). Pottery manufacture does not appear to have been organized at a higher regional level. Instead, pots generally appear to have been locally produced and used, with limited exchange of pots between different groups. Production appears to have been organized at an individual or family level, emphasizing production of largely utilitarian wares.

Pottery from sites in the northern Mojave is characterized by a relatively high number of elemental signatures suggesting higher levels of mobility (Eerkens et al. 2002b as cited in the CEC RSA, 2010). In addition to a higher degree of residential mobility, Eerkens (2003b as cited in the CEC RSA, 2010) suggests people inhabiting the northern Mojave Desert produced a fairly large number of pots. The combination of high mobility and a fairly high level of pottery production is seen as leading to caching pots near lowland wetlands, which were fixed in the landscape, development of pottery attributes promoting fuel consumption, and a high degree of standardization of largely utilitarian ceramics.

Sedentism in the Owens Valley, northeast of the project area, appears to have developed concurrently with, or immediately prior to, an emphasis on resource storage approximately 500 AD. Small seed intensification appears to have occurred about AD 1300–AD 1400, at the time brownware pottery became widely used. Eerkens concludes that social models, such as those suggesting the activities of aggrandizers or the stabilization of long-distance exchange networks, do not explain these developments. The role played by decrease(s) in population-to-resource balance(s), resulting from increased population pressure, remains unclear.

Eerkens (2003c; 2004 as cited in the CEC RSA, 2010) suggests the significant increase in small seed use and the advent of brownware pottery around AD 1300–AD 1400 are linked. People focused upon seeds because they could easily be privatized. That is, they could be individually owned and thus would not be subject to unrestricted sharing. Pots were a critical component of small seed intensification, because they generally were individually made and owned and could be used within houses, allowing food preparation and consumption to occur in private. Privatization of small seeds may have resulted from increased population size yielding more potential “freeloaders,” new community kinship structures, and the creation of resource surplus.

Horticulture

At the time of initial Euroamerican contact, 240 years ago, native peoples living along the Lower Colorado River and the Colorado Delta were growing a wide variety of domesticates and wild grasses, which provided 30–50 percent of their subsistence economy (Bean and Lawton 1973; Castetter and Bell 1951; Schaefer and Laylander 2007, pp. 253–254 as cited in the CEC RSA, 2010). Annual flooding of the floodplains along the Colorado rejuvenated the soil and provided enough moisture to sustain crops. Lower Colorado River agriculture is presumed to have begun around 700 AD. It probably spread either from the Hokokam area (to the east), or from northern Mexico (to the southeast) (McGuire and Schiffer 1982 as cited in the CEC RSA, 2010).

Horticulture subsequently appears to have spread west from the Colorado River. Desert Tipai peoples practiced floodplain agriculture along the New and Alamo Rivers. They also constructed small dams and ditches along washes to direct irrigation water onto adjacent terraces. Agricultural elements probably reached the Imperial Valley around AD 1700. Seed caches and mythological references to cultigens possibly indicate very late prehistoric adoption of agriculture. However, the caches contained both native and Old World cultigens. Thus it is unclear if agriculture penetrated west of the Peninsular Ranges in southern California before Euroamerican contact and the sustained influence that came with the establishment of Spanish missions.

Native cultigens may have reached the western Colorado Desert through trade instead of by local production (Schaefer and Laylander 2007, p. 254 as cited in the CEC RSA, 2010). Within the Colorado Desert, several archaeological sites have ceramic jars or rock-lined cache pits containing food remains of native or Old World plants (cf., Bayman et al. 1996; Swenson 1984; Wilke 1978; Wilke and McDonald 1989; Wilke et al. 1977 as cited in the CEC RSA, 2010). Pumpkin seeds occur in human coprolites (fossilized feces) from the Myoma Dunes at the north end of Lake Cahuilla, and also in a ceramic jar from the west shore of Lake Cahuilla, north of the Fish Creek Mountains. The latter dated to AD 1420–1660 (Wilke 1978; Wilke et al. 1977 as cited in the CEC RSA, 2010).

Early-to mid-nineteenth-century Cahuilla archaeological sites contain glass beads, flaked glass, domestic animal bones, carbonized maize and tepary beans, and uncarbonized gourds. Abundant evidence exists indicating the Cahuilla practiced irrigated agriculture during the early- and mid-nineteenth century. The paucity of macro- and micro-fossil cultigen remains from prehistoric archaeological deposits in Cahuilla territory strongly suggests agriculture did not play a significant role in the Cahuilla economy until the early nineteenth century. Early historic intensification of agriculture may have resulted from final desiccation of Lake Cahuilla, regional population growth, decreased mobility, and acculturation, including introduction of Euroamerican irrigation techniques.

In the Mojave Desert and environs, in the approximate period from AD 1–1200, agriculture first was practiced in southern Nevada and environs as a consequence of the Anasazi Intrusion (Warren 1984, p. 421, fig 8.25 as cited in the CEC RSA, 2010). Maize, squash, beans, grain amaranth, and sunflowers were grown. Agriculture was practiced along with foraging for wild plants and animals. Fields probably were irrigated in some manner. Agriculture appears to have intensified over time.

The Owens Valley Paiute were Great Basin Numic-speaking horticulturalists (Lawton et al. 1976; Liljeblad and Fowler 1986, pp. 417–418; Steward 1930, 1933, 1938, 1941, 1970 as cited in the CEC RSA, 2010). Ditch and surface irrigation of blue dicks (Brodiaea capitata), yellow nut grass (Cyperus esculentus), and spikerush (Eleocharis sp.), was practiced. This most likely developed during late prehistoric times, possibly triggered by increased population pressure resulting from climatic change and/or immigration (Bouey 1979 as cited in the CEC RSA, 2010).

Yohe (1997 as cited in the CEC RSA, 2010) notes aboriginal cultigens, such as melons, squash, and beans, were present at two rockshelters dating to the late nineteenth or early twentieth century in Death Valley. Fowler (1995, pp. 110–112; 1996, pp. 91–98 as cited in the CEC RSA, 2010) details garden horticulture among the Southern Paiute and Panamint and Timbisha Shoshone. Stream-irrigated gardens were cultivated, in which corn, beans, squash, sunflowers, and amaranth were grown. These groups also planted gardens near springs, had communal fields with irrigation ditches, and unirrigated stream-bank garden plots. Various land management practices were employed, including intentional burning, clearing, pruning, and coppicing, transplanting and cultivation, and cleaning of water sources.

Winter and Hogan (1986, pp. 125–127, table 1 as cited in the CEC RSA, 2010) note that during protohistoric times, agriculture was practiced by the southern California/Nevada Chemehuevi and Ash Meadows, Pahrump, Las Vegas, and Moapa Southern Paiute bands. Among the crops grown were corn, beans, squash, and sunflowers. Forms of plant husbandry directed towards non-domesticates included burning to encourage growth of new plants, broadcast seed sowing, and irrigation of wild stands of bulb and seed plants (Winter and Hogan 1986, pp. 128–129, table 2 as cited in the CEC RSA, 2010). These practices are thought to have begun prehistorically, continuing and possibly expanding during early historic times. Wallace (1980 as cited in the CEC RSA, 2010) suggests Native American agriculture in the Mojave region was exclusively a historic-period phenomenon.

Trade and Exchange

As Schaefer and Laylander (2007, pp. 254–256 as cited in the CEC RSA, 2010) note, prehistoric and ethnohistoric Colorado Desert peoples had a highly developed network of connections linking locations within and beyond the region. High mobility produced considerable cross-cultural interaction and integration in spite of frequent open aggression and warfare between different groups. This integration and interaction occurred between mobile hunter-gatherers and sedentary horticultural peoples. They are archaeologically manifested by the spatial distribution of site types, rock art, artifacts (especially ceramics and shell ornaments), and toolstones (especially obsidian).

Archaeologists monitor the dynamics of prehistoric trade in the Colorado Desert by analysis of the distributions of artifacts made from various lithics, shell beads and ornaments, and ceramic types and composition (Schaefer and Laylander 2007, pp. 255–256 as cited in the CEC RSA, 2010). As previously stated, with respect to lithics, obsidian from Obsidian Butte is fairly commonly represented in sites located within montane and coastal southern California (Hughes 1986; Hughes and True 1983; Laylander and Christensen 1988 as cited in the CEC RSA, 2010). Obsidian from sources in northern Baja California may have been routed via the Colorado Desert to coastal southern California sites (McFarland 2000 as cited in the CEC RSA, 2010). Wonderstone from the Rainbow Rock source is present in western San Diego County and the northern Coachella Valley (Bean et al. 1995; Pigniolo 1995 as cited in the CEC RSA, 2010).

Material for steatite artifacts found in Colorado Desert sites probably comes from sources in the Peninsular Ranges. Material for argillite artifacts may be from a central Arizona source.

Artifacts made from shellfish species inhabiting the northern Sea of Cortez occur in coastal southern California and the Great Basin (Bennyhoff and Hughes 1987; Fitzgerald et al. 2005 as cited in the CEC RSA, 2010) and may have been traded through the Colorado Desert (Schaefer and Laylander 2007, p. 255 as cited in the CEC RSA, 2010). Shells from southern California coastal species have been found at a number of Colorado Desert sites and those in the Southwest (Ford 1983 as cited in the CEC RSA, 2010). These artifacts may have resulted from direct procurement of shells, or exchange. At the Elmore site, associated with the protohistoric recession of Lake Cahuilla, shell debitage indicates local manufacture of shell beads and ornaments (Rosen 1995 as cited in the CEC RSA, 2010). In the Coachella Valley, shell artifacts may reflect close ties to peoples living along the Santa Barbara Channel.

A cache of Lower Colorado Buffware (i.e., Patayan) anthropomorphic figures found in an Orange County site indicates interregional connections (Koerper and Hedges 1996 as cited in the CEC RSA, 2010). These also are suggested by the frequency of Lower Colorado Buffware (i.e., Patayan/Hakataya) pottery throughout the Colorado Desert (Bean et al. 1995; Cordell 1997; McGuire 1982; Schaefer and Laylander 2007, p. 255; Schroeder 1979; Shaul and Hill 1998; Waters 1982 as cited in the CEC RSA, 2010). However, its use occurred among a number of prehistoric peoples practicing divergent settlement and subsistence patterns. Consequently little effort has been made to refine or apply the Patayan tradition as an integrative model.

On a local level, Plymale-Schneeberger (1993 as cited in the CEC RSA, 2010) examined pottery from three sites in Riverside County. Petrographic and geochemical analyses allowed quantitative distinction between Tizon Brown Ware and Lower Colorado Buff Ware. The study concluded that Brown Ware was locally produced while Buff Ware was imported. Seymour and Warren (2004 as cited in the CEC RSA, 2010) examined proportions of Tizon Brown Ware and Lower Colorado Buff Ware present at sites in Joshua Tree National Park and noted correspondence of pottery types with approximate boundaries of territories occupied by ethnohistorically known native peoples (that is, Cahuilla, Serrano, Chemehuevi).

Davis (1961 as cited in the CEC RSA, 2010) and Sample (1950 as cited in the CEC RSA, 2010) note that a considerable degree of historic-period trade between Native Americans occurred within and across the Colorado Desert. Trade networks across the Colorado Desert extended to the Yokuts and Chumash. Native peoples living along the Colorado River received and reciprocated goods from many groups living to the west.

Cultural Landscapes

In the Colorado Desert, trails, cairns, geoglyphs, cleared circles, rock rings, other desert pavement features, rock art sites, and artifact scatters appear to be some of the elements of prehistoric-ethnohistoric cultural landscapes[3] (Schaefer and Laylander 2007, pp. 254–255; Cleland and

[3] Cultural landscapes, when related to specific ethnic groups, are referred to as Ethnographic Landscapes (Hardesty 2000).

Apple 2003 as cited in the CEC RSA, 2010). Lower Colorado River geoglyph and rock art sites may represent prehistoric ceremonial centers, located along a route extending between sacred places, representing the cosmology and iconography of Yuman peoples (Altschul and Ezzo 1995; Cleland 2005; Ezzo and Altschul 1993; Gregory 2005; Hedges 2005; Johnson 1985, 2003; Woods et al. 1986 as cited in the CEC RSA, 2010).

Trails. During late prehistoric and ethnohistoric times, an extensive network of Native American trails was present in the Colorado Desert and environs (Heizer 1978; Cleland 2007; Sample 1950, p. 23; Apple 2005; Earle 2005; Melmed and Apple 2009; Von Werlhof 1986 as cited in the CEC RSA, 2010). Segments of many trails are still visible, connecting various important natural and cultural elements of landscapes. For example, these trails are often marked by votive stone piles/cairns and/or ceramic sherd scatters.

Late prehistoric-early historic Native American trail segments have been reported traversing roughly east/west through the Chuckwalla Valley (Johnston and Johnston 1957, map 1; Johnson 1980, pp. 89–93, fig. 1 as cited in the CEC RSA, 2010). Some trails may be located in the vicinity of the project site.

Rock Alignments and Geoglyphs. Geoglyphs were constructed on desert pavements by rearranging and/or clearing pebbles and rocks to form alignments, clearings, and/or figures (Arnold et al. 2002; Gilreath 2007, pp. 288–289; Solari and Johnson 1982 as cited in the CEC RSA, 2010). These constructions occur throughout the deserts of southeast California and adjacent portions of southern Nevada and western Arizona. Rock alignments are present throughout this region, while representational figures only occur close to the Lower Colorado River.

In the Mojave Desert, large rock alignments are found in Panamint Valley, Death Valley, Eureka Valley, and the Owens River Valley (Davis and Winslow 1965; Gilreath 2007, pp. 288–289; von Werlhof 1987 as cited in the CEC RSA, 2010). They have been interpreted as resulting from group ritual(s) (von Werlhof 1987 as cited in the CEC RSA, 2010). Many appear characterized by multiple-use episodes, with portions added through the years as part of ongoing rituals/ceremonies.

Colorado River geoglyphs include the Topock Maze (Rogers 1929 as cited in the CEC RSA, 2010) and a few dozen giant ground figures (Harner 1953; Setzler and Marshall 1952 as cited in the CEC RSA, 2010), often first observed from the air. During historic times, the Top Rock Maze was used by Yuman peoples for spiritual cleansing.

Johnson (1985, 2003 as cited in the CEC RSA, 2010), von Werlhof (2004 as cited in the CEC RSA, 2010), and Whitley (2000 as cited in the CEC RSA, 2010) relate the geoglyphs to Yuman cosmology, origin myths, and religion. Cation ratio dating[4] of desert varnish has provided

[4] Cation ratios between weathered rock varnish and unweathered rock are used as a relative dating technique to roughly determine the age of prehistoric rock carvings (petroglyphs). The quantity of positively-charged ions within the varnish (a chemically-changed layer built up of calcium and potassium leachate over time) is compared to those within the unweathered rock beneath the varnish.

estimated ages of approximately AD 800–1000 for the Colorado geoglyphs (Dorn et al. 1992; Schaefer 1994, p. 63; von Werlhof 1995 as cited in the CEC RSA, 2010), although use of the technique remains controversial (Gilreath 2007, p. 289 as cited in the CEC RSA, 2010).

Von Werlhof (1995, 2004 as cited in the CEC RSA, 2010) relates these sites to the Yuman creation story. They also may have functioned as focal points for shamanistic activities, vision quests, curing, and group rituals/ceremonies. Symbolic activities also were represented by intentional pot-drop distributions along trails near water sources. The importance to Native Americans of water sources for survival during long-distance trips and seasonal rounds is obvious. Water sources also manifested significant spiritual values and often were associated with major rock art complexes (McCarthy 1993; Schaefer 1992 as cited in the CEC RSA, 2010).

Ethnographic Background

Currently, the region in which the project site is located is believed to have been occupied at various times by the Chemehuevi, Serrano, Cahuilla, Mojave, Quechan, Maricopa, and Halchidhoma.

Singer (1984, pp. 36–38 as cited in the CEC RSA, 2010) concluded the Chuckwalla Valley was not clearly assigned to any Native American group on maps depicting group territories. Following Johnston and Johnston (1957 as cited in the CEC RSA, 2010), Singer observed that the west end of the Chuckwalla Valley was near the intersecting boundaries of Cahuilla-Serrano-Chemehuevi territory. Possibly before 800 BC, the Chemehuevi may have expanded into Serrano territory, occupying the Chuckwalla Valley. No physical evidence suggested that the Cahuilla occupied the area. Given its east-west orientation and location, however, the Chuckwalla Valley may have been neutral territory, occupied by no Native American group in particular, which served as an east-west trade and travel route.

The Cahuilla

A wealth of information exists regarding traditional and historic Cahuilla society and culture (see Bean and Lawton 1967 for a comprehensive bibliography of sources). Primary sources for the Cahuilla include Bean (1972; 1978), Bean and Saubel (1972), Drucker (1937), Gifford (1918), Hooper (1920), James (1960), Kroeber (1908; 1925, pp. 692–708), and Strong (1929, pp. 36–182). The Cahuilla language, divided into Desert, Pass, and Mountain dialects, has been assigned to the Cupan subfamily of the Takic branch of the Uto-Aztecan linguistic family (Golla 2007; Moratto 1984; Shipley 1978. (As cited in the CEC RSA, 2010).

Territory traditionally claimed by the Cahuilla was topographically complex, including mountain ranges, passes, canyons, valleys, and desert. Bean (1978, p. 375 as cited in the CEC RSA, 2010) described it as, "…from the summit of the San Bernardino Mountains in the north to Borrego Springs and the Chocolate Mountains in the south, a portion of the Colorado Desert west of Orocopia Mountain to the east, and the San Jacinto Plain near Riverside and the eastern slopes of Palomar Mountain to the west." The natural boundaries of the desert, mountains, hills, and plains separated the Cahuilla from surrounding Native American groups. The Cahuilla interacted with surrounding peoples via intermarriage, ritual, trade, and war. The Cahuilla, Cupeno, Gabrielino, Serrano, and Luiseño shared common cultural traditions. The neighboring Cupeno were closest linguistically to the Cahuilla.

Cahuilla villages usually were located in canyons or on alluvial fans near water and food patches. The area immediately around a village was owned in common by a lineage. Other lands were divided into tracts owned by clans, families, and individuals. Numerous sacred sites with rock art were associated with each village. Trail networks used for hunting, trading, and social visiting connected villages. Trading was a prevalent economic activity. Some Cahuilla were trading specialists. The Cahuilla went as far west as the Channel Islands and east to the Gila River to trade.

Men hunted deer, mountain sheep, pronghorn, rabbits, rodents, and birds. This game was stalked/pursued/trapped by individuals and communal hunting groups. Blinds, pits, bows and arrows, throwing sticks, nets, snares, and traps were used to procure game. Communal hunts using fire drives sometimes occurred.

The Cahuilla had access to an immense variety of plant resources present within a diverse suite of habitats (Barrows 1900; Bean and Saubel 1972 as cited in the CEC RSA, 2010). Several hundred plant species were used for food, manufacture, and medicine. Acorns, mesquite and screw beans, pinyon nuts, and cactus fruits were the most important plant foods. They were supplemented by a host of seeds, tubers, roots, bulbs, fruits and berries, and greens. Corn, beans, squash, and melons were cultivated. Over 200 species of plants were used as medicines.

Structures varied in size from brush structures to dome-shaped or rectangular houses, 15–20 feet long, and ceremonial houses. The chief’s house usually was the largest. Used for many social, ceremonial, and religious functions, it was located near a good water source. It generally was next to the ceremonial house, which was used for rituals, curing, and recreational activities. Other structures included a communal men’s sweathouse and granaries.

Mortars and pestles, manos and metates, pottery, and baskets were used to process and prepare plant and animal foods. Cahuilla material culture included a variety of decorated and plain baskets; painted/incised pottery; bows, arrows, and other hunting-related equipment; clothing, sandals, and blankets; ceremonial and ritual costumes and regalia; and cordage, rope, and mats. Games and music were important social and ritual activities for the Cahuilla.

The Cahuilla had named clans, composed of 3–10 lineages, with distinct dialects, common genitors, and a founding lineage. Each lineage owned particular lands, stories, songs, and anecdotes. Each lineage occupied a village and controlled specific resource areas. All clan members jointly owned clan territory. Territory ownership was established by marked boundaries (rock art, geographic features), and oral tradition. Most of a clan’s territory was open to all Cahuilla. Kinship rules determined rights to assets and responsibilities within a lineage. Each lineage cooperated in defense, large-scale subsistence activities, and ritual performance. The founding lineage within a clan often owned the office of ceremonial leader, the ceremonial house, and sacred bundle. Artifacts and equipment used in rituals and subsistence was owned by individuals and could be sold or loaned.

The office of lineage leader usually passed from father to eldest son. He was responsible for correct performance of rituals, care of the sacred bundle, and maintenance of the ceremonial house. The lineage leader also determined when and where people could gather and hunt, administered first-fruits rites, and stored food and goods. He knew boundaries and ownership rights, resolving conflict with binding decisions. The lineage leader met with other lineage leaders concerning various issues. He was assisted in his duties by a hereditary official responsible for arranging details for performance of rituals. Other functionaries included song leaders/ceremonialists, assisted by singers and dancers.

Laws were enforced by ritual, stories, anecdotes, and direct action. Supernatural and direct sanctions were used. Tradition provided authority. The past was the referent for the present and future. Old age provided access to privilege, power, and honor. Reciprocity was a significant expectation. Doing things slowly, deliberatively, and thoughtfully was stressed. Integrity and dependability in personal relations were valued. Secrecy and caution were exercised in dealing with knowledge.

Armed conflict occurred after all other efforts to resolve things had failed. A lineage leader and/or skillful warrior lead a temporary war party. Community rituals were held before and after a fight, which usually involved ambush.

Ritual and ceremony were a constant factor in Cahuilla society. Some ceremonies were scheduled and routine, while others were sporadic and situational. The most important ceremonies were the annual mourning ceremony, the eagle ceremony, rites of passage (especially those associated with birth, naming, puberty, and marriage), status changes of adults, and rituals directed towards subsistence resources. The main focus was upon performance of cosmologically oriented song cycles, which placed the Cahuilla universe in perspective, reaffirming the relationship(s) of the Cahuilla to the sacred past, present, to one another, and to all things.

The Serrano

Sources for the Serrano include Bean and Smith (1978), Benedict (1924,1929), Drucker (1937), Gifford (1918), Johnson (1965), Kroeber (1925, pp. 615–619), and Strong (1929, pp. 5–35). The Serrano shared many traits and artifacts with the Cahuilla, discussed above. The Serrano spoke a language belonging to the Serean Group of the Takic subfamily of the Uto-Aztecan family (Golla 2007; Moratto 1984; Shipley 1978). (As cited in the CEC RSA, 2010.)

It is nearly impossible to assign definite boundaries to Serrano territory. Territory traditionally claimed by the Serrano included the San Bernardino Mountains east of Cajon Pass, lands at the base and north of the San Bernardinos in the desert near Victorville, and territory extending east in the desert to Twentynine Palms and south to, and including, the Yucaipa Valley.

The Serrano occupied small village-hamlets located mainly in the foothills near water sources. Others were at higher elevations in coniferous forest, or in the desert. The availability of water was a critical determinant of the nature, duration, and distribution of Serrano settlements.

Women gathered, and men hunted and occasionally fished. Topography, elevations, and biota present within the Serrano territory varied greatly. Primary plant foods varied with locality. In the foothills, they included acorns and pinyon nuts. In the desert, honey mesquite, pinyon, yucca roots, and cactus fruits were staples. In both areas they were supplemented by a variety of roots, bulbs, shoots, and seeds, especially chia. Among primary game animals were deer, mountain sheep, pronghorn, rabbits, rodents, and quail. Large game was hunted with bows and arrows. Small game was taken with throwing sticks, traps, snares, and deadfalls. Meat was cooked in earth ovens. Meat and plant foods were parched or boiled in baskets. Plant foods were ground, pounded, or pulverized in mortars and pestles or with manos and metates. Processed meat and plant foods were dried and stored. Occasional communal deer and rabbit hunts were held. Communal acorn, pine nut, and mesquite gathering expeditions took place. These communal activities involved several lineages under a lineage leader's authority.

Serrano houses were circular, domed, individual family dwellings, with willow frames and tule thatching. They were occupied by a husband and wife along with their children, and often other kin. Houses were mainly used for sleeping and storage. Most daily activities occurred outside, often in the shade of a ramada (a flat-roofed, open-sided shade structure) or other sun cover.

Settlements usually had a large ceremonial house where the lineage leader and his family lived. It was the social and religious center for each lineage/lineage set. The latter was two or more lineages linked by marriage, economic reciprocity, and ritual participation. Other structures included semi-subterranean, earth-covered sweathouses located near water, and granaries.

Serrano material culture was very similar to that of the Cahuilla. Stone, wood, bone, plant fibers, and shell were used to make a variety of artifacts. These included highly decorated baskets, pottery, rabbit skin blankets, bone awls, bows and arrows, arrow straighteners, fire drills, stone pipes, musical instruments, feathered costumes, mats, bags, storage pouches, cordage, and nets.

The clan was the largest autonomous landholding and political unit. No pan-tribal union between clans existed. Clans were aligned through economic, marital, and ceremonial reciprocity. Serrano clans often were allied with Cahuilla clans and Chemehuevi groups. The core of a clan was the linage. A lineage included all men recognizing descent from a common ancestor, their wives, and their descendants. Serrano lineages were autonomous and localized, each occupying and using defined, favored territories. A lineage rarely claimed territory at a distance from its home base.

The head of a clan was a ceremonial and religious leader. He also determined where and when people could hunt and gather. Clan leadership was passed down from father to son. The clan leader was assisted by a hereditary ceremonial official, from a different clan. This official held ceremonial paraphernalia (the sacred bundle), notified people about ceremonies, and handled ceremonial logistics.

Serrano shamans were primarily healers who acquired their powers through dreaming. A shaman cured illness by sucking it out of the sick person and by the administration of herbal medicines. Various phases of an individual's' life cycle were occasions for ceremonies. After a woman gave birth, the mother and baby were "roasted," and a feast held. Differing puberty ceremonies were held for boys (datura ingestion used in a structured ceremonial vision quest) and girls ("pit roasting," ingestion of bitter herbs, dietary restrictions, instruction on how to be good wives). The dead were cremated, and a memorial service was held. During the annual seven-day mourning ceremony, the sacred bundle was displayed, the eagle-killing ceremony took place, a naming ceremony for all those born during the preceding year was held, images were made and burned of those who had died in the previous year, and the eagle dance was performed.

The Chemehuevi

Sources for the Chemehuevi include Drucker (1937), Kelly (1934; 1936), Kelly and Fowler (1986), Kroeber (1925, pp. 593–600), Miller and Miller (1967), and Roth (1976; 1977). Carobeth Laird married a Chemehuevi and collected a large corpus of data, primarily on ritual, religion, and myth (Laird 1974a; 1974b; 1975a; 1975b; 1976; 1977a; 1977b; 1977c; 1978a; 1978b; 1984). The Chemehuevi spoke a language belonging to the Southern Group of the Numic subfamily of the Uto-Aztecan family (Golla 2007; Moratto 1984; Shipley 1978). Many traits characterizing Chemehuevi culture are very similar or identical to those of the Mojave, discussed below. Several probable Quechan traits also were noted for the Chemehuevi. (As cited in the CEC RSA, 2010).

For the territory traditionally claimed by the Chemehuevi, the Colorado River formed the eastern boundary south to the Palo Verde Mountains. The boundary then ran northwest, passing east of the Ironwood Mountains, crossing the Maria Mountains, paralleling the Iron Mountains, and then running between Old Woman Mountain and Cadiz Dry Lake (Kelly 1934; Kelly and Fowler 1986, p. 369, fig. 1 as cited in the CEC RSA, 2010). Mojave territory lay to the northeast, and that of the Las Vegas group of Southern Paiute to the north-northwest.

The Chemehuevi lacked any form of overall "tribal" organization. Anthropologists refer to territorial subdivisions among the Chemehuevi as "bands." Each band was composed of a small number of camps/communities/villages. Bands most likely corresponded to economic clusters (Kelly 1964 as cited in the CEC RSA, 2010). Each group was a geographic unit, associated with a definite territory. In general, each band was economically self-sufficient.

In general, Chemehuevi settlement was mobile and scattered, with residence recurring within a fixed area. Houses were closely grouped. Their occupants usually were related by blood or marriage. Settlement size ranged from 1–2 households up to 10–20. Springs often were inherited private property. Married siblings often camped at the same spring.

The Chemehuevi traveled widely. They had amicable contact with the Serrano, Cahuilla, Quechan/Yumans, and other Native American groups. The Chemehuevi sometimes joined with the Mojave/Quechan to fight the Cocopa/Halchidhoma. The Chemehuevi often crossed the Colorado River and hunted deer in Quechan, Yavapai, and Western Walapai territory. They also traded, intermarried, and competed in games with the Yavapai. To the west, the Chemehuevi hunted in the Tehachapi area and went to the Pacific Coast along the Santa Barbara Channel to get abalone shell. Sometimes, a party of 8–10 Chemehuevi men joined men from neighboring groups to make a two-month journey to the Hopi villages (in what is now New Mexico) to trade.

The Chemehuevi apparently did not eat fish, but bighorn sheep, deer, pronghorn antelope, and desert tortoise were among the animal food resources they used (Kelly and Fowler (1986, p. 369 as cited in the CEC RSA, 2010). Plant foods in this region included pinyon nuts and mescal. Men inherited rights to hunt large game within certain tracts, defined in songs using geographic references. Women gathered a great variety of plant foods, which were more important in the Chemehuevi diet than game. In addition to pinyon nuts and mescal, agave and seeds were staples. Along the Colorado River, the Chemehuevi practiced floodplain agriculture. They grew corn, squash, gourds, beans, sunflowers, amaranth, winter wheat, grasses, and devil’s claw using techniques similar to Mojave agricultural practices (see below).

Chemehuevi winter houses were conical/sub-conical structures. They also built earth-covered houses without a front wall, similar to those constructed by the Mojave. During the summer, many Chemehuevi lived outside, often building and occupying armadas and windbreaks.

With respect to material culture, Chemehuevi baskets and cradles were made from plant fibers. Plant fibers also provided materials for rope, string, and cordage nets. Pottery, which followed Mojave patterns and styles, included cooking pots, water jars, seed germination and storage pots, spoons/scoops, and large pots for ferrying children across the Colorado River. Watercraft included log rafts and reed balsas. Clothing consisted of double skin or fiber aprons and sandals for men and women. The Chemehuevi commonly had pierced ears and wore body paint.

Monogamy was the commonest form of marriage among the Chemehuevi, but some men had more than one wife. Women gave birth in a special enclosure, followed by a 30-day period of seclusion for mother, father, and child. Puberty rites for boys and girls were held, with the former focused on acquisition of hunting skills. Cremation of the dead was traditional, replaced by in-ground burial in the historic period.

In general, no central political control existed. Territorial boundaries were not rigid, and some bands were named, while others were not. The basic social and economic unit was the nuclear family and could include other close kin. Groups of individual households moved together on hunting and gathering trips, returning to the same spring or agricultural site. Most large bands had a headman whose leadership was more advisory than authoritative. He was usually succeeded by his eldest son.

The principal role of Chemehuevi shamans was curing illness. They acquired their healing powers through dreams rather than through the use of datura or a trance. Chemehuevi families held a mourning ceremony (“cry”), with which several speeches and songs were associated, within the year after the death of a relative. The “cry” was sponsored by the family and included the ceremonial burning of material goods.

The Chemehuevi had deer and mountain sheep song-dances, held for entertainment and hunting success. The Chemehuevi had other songs, as well: bird, salt, quail, and funeral songs. During winter evenings, men narrated a rich body of traditional stories and myths. These performances often included mimicry, song, and audience participation. Oral tradition related people to social norms, their territories, and to the subsistence resources present within them.

The Mojave

Information regarding the traditional lifeways of the Mojave has mainly been drawn from the accounts of early explorers and/or fur trappers who were among the first to encounter native groups, as well as from the later ethnographic accounts of anthropologists, usually well after the influences of Euro-American contact had begun to alter traditional ways of life. The following summary derives mainly from Kroeber (1925) and Stewart (1983a, 1983b) as cited in the CEC RSA, 2010.

The name Mojave is a variation on the name Hamakhava, which is what the tribal people called themselves (Kroeber 1925, p. 727 as cited in the CEC RSA, 2010). The Mojave language is classified into the Yuman subfamily of the Hokan language family. The Mojave were the northernmost and largest tribe of the River and Delta Yumans, who comprised a series of agricultural tribes that occupied the lower Colorado and Gila Rivers. The traditional ethnographic territory attributed to the Mojave includes the Mojave, Chemehuevi, and Colorado River Valleys along the lower Colorado River at the intersection of the borders of Arizona, Nevada, and California. In pre-contact times, Mojave tribal settlement is reported to have centered in the Mojave Valley where their population densities were observed to be the greatest (Stewart 1983b, p. 55 as cited in the CEC RSA, 2010).

The Colorado River served as an oasis in the otherwise harsh, dry environment that surrounded the river valleys. The spring overflow of the river, which spread gently over the bottomlands, left behind a rich silt deposit in its recession. It is within these bottomlands that the Mojave cultivated crops, which served as the foundation of their subsistence economy. Their agricultural methods were relatively simple, consisting of planting seeds on the richly silted floodplains and allowing their crops to mature with a minimum of maintenance or effort. Corn was the primary crop, but several varieties of tepary beans, pumpkins, melons, and other plants were also grown. Once harvested, the portions of the harvest that were not immediately consumed were dried in the sun and stored in large basketry granaries. The Mojave supplemented their diet mainly by gathering wild plants and by fishing, which served as their principle source of meat. Hunting played a minor role in the Mojave subsistence economy (Stewart 1983b, pp. 56–59 as cited in the CEC RSA, 2010).

Technology of the Mojave was relatively simple, and tools were reported to have been crafted to meet only the minimum requirements of utility (Stewart 1983b, p. 59 as cited in the CEC RSA, 2010). According to Kroeber (1925, p. 736 as cited in the CEC RSA, 2010), the farming implements consisted of only two items: a heavy wooden staff or digging stick for planting and a spatulate wooden hoe-like implement, whose square edge was pushed flat over the ground to control weeds. Metates, consisting of a rectangular block of stone, were used for grinding corn, wheat, and beans, and both stone and wooden pestles, as well as stone mortars, were also used for food processing (Kroeber 1925, pp. 736–737 as cited in the CEC RSA, 2010). Fish were commonly taken with seines, large basketry scoops, sieves, dip nets, and weirs. The bow and arrow and cactus-spine fish hooks were also used for fishing. Mojave basketry was crudely woven, and their pottery was basic and utilitarian (Stewart 1983b, p. 59 as cited in the CEC RSA, 2010). Since hunting was of relatively little significance to the Mojave, hunting devices and techniques were not well developed, consisting mainly of snares, nets, bow and arrow, or curved throwing sticks (Stewart 1983b, pp. 59–61 as cited in the CEC RSA, 2010).

Mojave political and social organization was very informal, and no one individual or group had significant authority over another. Despite the Mojave's loose division into bands or local groups that were spread out over great distances, their cohesion as a tribe was very strong, and they considered themselves as one people occupying a nation with a well-defined territory (Stewart 1983a, 1983b as cited in the CEC RSA, 2010).

The nuclear family was the basic unit of economic and social cooperation, although the extended family constituted the core of a settlement. Rather than large centralized villages, Mojave settlements were widely distributed along the riverbanks in close proximity to arable lands. Houses were situated on low rises above the floodplain and often separated by as much as a mile or two (Stewart 1983b, p. 57 as cited in the CEC RSA, 2010). During most of the year, the Mojave slept under ramadas; however, during the colder season, they occupied more substantial, semi-subterranean, rectangular earth-covered houses.

Warfare was a dominant strain in River Yuman culture, and the Mojave's strong tribal unity served them well in times of warfare. They apparently traveled great distances to do battle, and their principle weapons were bows and arrows and hard wood clubs. According to Kroeber (1925, p. 727 as cited in the CEC RSA, 2010), their main motivation was sheer curiosity, as they liked to see other lands and were eager to know the manners of other peoples, but were not heavily interested in trade.

The Mojave were culturally similar to the other River and Delta Yumans: the Quechan, Halchidhoma, Maricopa, and Cocopa. During ethnohistoric times, the Quechan were considered friends and allies of the Mojave, while the Halchidhoma, Maricopa, and Cocopa were considered to be enemies with whom the Mojave engaged in warfare (Stewart 1983b, p. 56 as cited in the CEC RSA, 2010). The Mojave were also friendly with the Upland Yuman tribes of the Yavapai and Walapai of western Arizona, although relations with the Walapai were somewhat mixed.

One of the most important rituals observed by the Mojave centered on death, namely the funeral and subsequent commemorative mourning ceremony. As soon as possible after death, the deceased was cremated upon a funeral pyre along with all of his or her possessions. The house and granary of the deceased were also burned. It was believed that by burning, these things would be transmitted to the land of the dead along with the soul of the deceased (Stewart 1983b, pp. 65–67 as cited in the CEC RSA, 2010).

Due to their relatively remote location inland, the Mojave maintained their independence throughout the Spanish period of the sixteenth and seventeenth centuries and were only rarely visited by explorers during that time. The few Spanish accounts of encounters with the Mojave provided similar descriptions of Mojave lifeways as those reported later by ethnographers. It is believed that the ancestors of the Mojave resided in the area for at least 1000 years and the mode of life in prehistoric times is thought to be similar to that observed historically (Stewart 1983b, p. 56 as cited in the CEC RSA, 2010).

The Quechan/Yuma

The following summary of the Quechan or Yuma is derived mainly from Bee (1983), Kroeber (1925), and Stewart (1983a) as cited in the CEC RSA. 2010.

Quechan is a variation on the names Kwichyan or Kuchiana, which are the names the tribe called themselves, but this group was also commonly known as the Yuma. The Quechan are among the Yuman-speaking tribes who occupied the lower Colorado River where it forms the boundary between California and Arizona. According to Kroeber (1925, p. 782 as cited in the CEC RSA, 2010), the Quechan and their neighbors to the north, the Mojave, appear to be virtually identical in terms of their agriculture, manufactures, clothing, hairdress, houses, warfare, and sense of tribal unity.

The territory traditionally associated with the Quechan, now divided between the states of California and Arizona, is centered around the confluence of the Colorado and the Gila Rivers, extending several miles north and south along the Colorado and east along the Gila. Quechan legend tells of a southward migration of their ancestors from a sacred mountain; however, it is not known when the ancestors of the Quechan first settled near the confluence (Bee 1983, p. 86 as cited in the CEC RSA, 2010). No group of this name was mentioned in the account of Hernando de Alarcón when he passed through the area during an expedition in 1540, and the first reference to this group did not appear in Spanish documents until the late seventeenth century, at which time they were settled around the river confluence area (Bee 1983, p. 86 as cited in the CEC RSA, 2010).

In an environment otherwise surrounded by dry desert terrain, the subsistence economy of the Quechan focused on riverine agriculture, which was one of the main sources of food for the tribe. Crops were cultivated in the richly silted river bottomlands following the recession of the spring floods and provided a relatively high yield in exchange for relatively low labor output (Bee 1983, pp. 86–87 as cited in the CEC RSA, 2010). The main cultivated crops included corn, tepary beans, pumpkins, and gourds. In post-contact times, watermelons, black-eyed peas, muskmelons, and wheat were introduced by Europeans and brought into cultivation by the Quechan, as well. The Quechan also relied on the gathering of wild foods, the most important of which were mesquite and screw-bean pods, although a variety of other wild plants were also collected (Bee 1983, p. 87; Castetter and Bell 1951, pp. 187–188 as cited in the CEC RSA, 2010). Fishing was of minor importance, as there were few species in the lower Colorado River suitable for eating. Among the fish sought were the humpback, white salmon, and boneytail, which were sometimes caught with unfeathered arrows or cactus spine hooks, but more often taken with traps and nets during floods (Forde 1931, pp. 107–120 as cited in the CEC RSA, 2010). Given the low incidence of game available in the area, hunting played a minor role in the overall subsistence economy (Bee 1983, p. 86 as cited in the CEC RSA, 2010).

Like the Mojave, Quechan tribal settlements, or rancherias, consisted of extended family groups that were widely dispersed along the riverbanks. Settlements shifted throughout the year, dispersing into smaller groups along the bottomlands during the spring and summer farming seasons and reconvening into larger groups on higher ground, away from the river, during the winter and spring flood periods (Bee 1983, pp. 87–88 as cited in the CEC RSA, 2010). The geographic dispersion of the households within the rancheria groups was closely correlated with the condition of the rivers and the technology of riverine agriculture (Bee 1983, p. 89 as cited in the CEC RSA, 2010). The warm climate and scant precipitation made substantial housing unnecessary for most of the year, so most people made use of ramadas or dome-shaped arrowweed shelters. Each rancheria typically had one or two large, earth-covered shelters for the rancheria leaders' families, but these shelters also accommodated small crowds during colder weather (Forde 1931, p. 122 as cited in the CEC RSA, 2010).

Much like the Mojave, Quechan technology lacked technical or decorative elaboration beyond the demands of minimal utility (Bee 1983, p. 89 as cited in the CEC RSA, 2010). Quechan bows did not feature "backed" construction and so lacked power, and their arrows were frequently untipped, so the bow and arrow's range was short and the penetrating power weak. Sharpened staffs served as digging sticks or, when cut in longer lengths, as weapons (Bee 1983, p. 89 as cited in the CEC RSA, 2010).

In terms of property, there were no marked gradations in wealth, and social pressure favored the sharing of one's abundance with others who were less fortunate. Land ownership was informal, and people did not show much interest in the accumulation of material goods beyond the immediate needs of the family group or the surplus maintained by local leaders for redistribution to needy families within their rancheria (Bee 1983, p. 89 as cited in the CEC RSA, 2010). Lands were not inherited by family members upon the death of an individual; rather, the lands of the deceased were abandoned, and replacement plots were sought by the family members.

Despite the wide distribution of settlements, the Quechan had a strong sense of tribal unity. As with their neighbors and allies, the Mojave, warfare played a major role in Quechan culture, and it was during times of warfare that tribal unity was most prevalent among the individual settlements (Bee 1983, p. 92 as cited in the CEC RSA, 2010). Their major enemies were the Cocopa and the Maricopa, and they often allied themselves with the Mojave in strikes against common enemies (Bee 1983, p. 93 as cited in the CEC RSA, 2010). Bee (1983, p. 93 as cited in the CEC RSA, 2010) suggests that warfare among the riverine peoples may have increased in scale and intensity during the eighteenth and early nineteenth centuries due to new economic incentives, such as the opportunity to trade captives to the Spaniards or to other tribes for horses or goods.

Quechan social and political organization, like that of the Mojave, appears to have been very informal, with no one individual or group having significant authority over others. Two types of tribal leadership have been reported for the Quechan, one for civil affairs and the other for war, but it is questionable how influential these leadership roles may have been. Each rancheria had one or more headmen, but their authority was contingent upon public support and continued demonstration of competence. According to Bee (1983, p. 92 as cited in the CEC RSA, 2010), important matters at either the tribal or the rancheria level were always decided by consensus, sometimes after long debates dominated by the better and more forceful speaker.

Another important aspect of Quechan society that was shared with the Mojave concerns the commemoration of the dead, which was an elaborate ceremony involving wailing and the destruction of property and ritual paraphernalia. All possessions of the deceased, including the family home, were destroyed or given away (Bee 1983, pp. 89, 93–94 as cited in the CEC RSA, 2010).

The Maricopa and the Halchidhoma

Ethnographic information for the Maricopa and Halchidhoma is meager in comparison to the Mojave and the Quechan. The following brief summary is derived from Harwell and Kelly (1983) and Stewart (1983a) as cite in the CEC RSA, 2010.

The Halchidoma first entered written history in the early seventeenth century wit
, who encountered the “Alebdoma” or “Halchedoma” during a Spanish expedition on the lower Colorado River, below its junction with the Gila River. When later encountered by missionary-explorer Eusebio Francisco Kino in the early eighteenth century, the Halchidhoma (or “Alchedoma,” as they were referred to by Kino) had moved farther north up the Colorado beyond the Gila. The traditional territory attributed to the Halchidhoma lay along the lower Colorado between the Mojave and the Quechan territories. They were later driven from that area under pressure from their hostile Mojave and Quechan neighbors and moved to the middle Gila River area, where some merged with the Maricopa (Stewart 1983a as cited in the CEC RSA, 2010).

The term Maricopa refers to the Yuman-speaking groups who in the early nineteenth century occupied the area along or near the Gila River and its tributaries (in what is now southern Arizona), but who earlier had occupied the lower Colorado River area. The Maricopa language is closely related to Quechan and Mojave, all three of which are classified as members of the River branch of the Yuman language family (Harwell and Kelly 1983, p. 71 as cited in the CEC RSA, 2010). The Maricopa call themselves pi•pa•s, “the people.” The name Maricopa is an English abbreviation of the name Cocomaricopa, first used by Eusebio Kino in the late seventeenth century (Harwell and Kelly 1983, p. 83 as cited in the CEC RSA, 2010).

The Maricopa, who by the early nineteenth century included remnant tribes of the Halyikwamai, Kahwan, Halchidhoma, and Kavelchadom, share common origins and are culturally similar to both the Quechan and the Mojave, the most prominent traits of which included floodwater agriculture and cremation of the dead. Their material culture was also essentially the same (Harwell and Kelly 1983, p. 71 as cited in the CEC RSA, 2010). The Colorado River Maricopa lived in low, rectangular, earth-covered houses, but the Maricopa of the Gila River had adopted the round houses of their Piman neighbors. Technology was of little interest to the River Yumans and remained at a low level of development (Stewart 1983a as cited in the CEC RSA, 2010).

Historical Background

The project site is located in an area that has historically been and remains remote from centers of development and settlement. The primary themes in this discussion focus on Spanish and Mexican routes through the desert, and early American traffic, mining, transportation, military training, power transmission, and agriculture/ranching.

Spanish and Mexican Routes through the Desert

Sixteenth-century maritime Spanish explorer, Hernando de Alarcon, made the first in-roads into the region in 1540, ascending 85 miles up the Colorado River to the head of navigation near present-day Yuma. Alarcon was sent to supply Coronado’s land expedition that had set out on foot from Compostela, Mexico, in search of the fabled seven cities of gold. He eventually cached the supplies and departed after waiting many days. Melchior Diaz, leading a small contingent of Coronado’s land unit, later arrived and recovered the supplies. Both Alarcon and Diaz reported the bleak nature of the country. The interior of the Colorado Desert was not explored further until 1702 when Father Eusebio Francisco Kino, a Jesuit missionary, situated in Sonora, began seeking an overland route to coastal California (Rice et al. 1996; Hague 1976; Von Till Warren 1980, pp 83–88 as cited in the CEC RSA, 2010).

Nearly seventy years later, Francisco Garcés (a Franciscan Padre) also seeking a route to the coast, forded the Colorado River at the mouth of the Gila River, traveling west through the desert before despairing and turning back. His efforts were eventually rewarded in March of 1774, arriving at Mission San Gabriel, accompanying the expedition of Captain Juan Bautista de Anza (Rice et al. 1996, Hague 1976 as cited in the CEC RSA, 2010). Two mission outposts were subsequently established near present-day Yuma in 1779 to minister to the native Quechan and strengthen Spain’s hold on this strategic point of entry into California. All passage along this route, later known as the Anza or Yuma Trail, was discontinued in 1781 when the Quechan revolted, killing over thirty missionaries, settlers, and soldiers, including Garcés.

Jose Maria Romero, a Mexican Army captain, explored a second route between 1823 and 1826, along the indigenous Halchidhoma Trail. He had learned of this route a couple of years earlier when a group of Cocomaricopa Indians from Arizona arrived at Mission San Gabriel, having reportedly crossed the Colorado River near present-day Blythe, journeying westward through the Chuckwalla Valley and over the San Gorgonio Pass. On January 6, 1824, Romero was likely in the vicinity of Palen Lake (Bean and Mason 1962, pp. 40–41 as cited in the CEC RSA, 2010), having made his way up the Salton Wash, between the Orocopias and Chuckwallas. Estudillo, one of the members of the expedition, noted horse paths and footpaths of the Indians, and bones along the trail (Johnson 1980 as cited in the CEC RSA, 2010).

Early American Trans-Desert Crossings

In 1846, during the opening stages of the Mexican-American war, General Stephen Watts Kearny led an advance column of the United States Army into the region. From Santa Fe, Kearny’s troops entered California by way of Yuma, reaching San Diego in December, having abandoned their wagons shortly after crossing the Rio Grande. The war ended in 1848 with the signing of the Treaty of Guadalupe Hidalgo.

Only days after the Mexican-American War ended, gold was discovered, kicking off the California Rush of 1849. It is estimated that more than 100,000 travelers passed by way of the Yuma Crossing.[5] The presence of so many travelers along the route had a definite impact on the desert. Whereas previous expeditions made the journey in isolation, during the Gold Rush, trails became relative highways. Companies of miners frequently encountered one another or ran across the remains of recently vacated campsites. The desert floor also became littered with articles abandoned when they either fell apart or proved too heavy or cumbersome for their weary owners. Broken wagons, furniture, articles of clothing, tools and even weapons left by the side of the road proved to be a bonanza for scavengers (Lamb n.d.).

After 1851, travel to California along the southern route through the Colorado Desert declined (Lamb n.d.). Horse traders and livestock drovers still used the trail to drive herds from Texas and Mexico to California and the U.S. Army continued to send caravans of provisions from San Diego to its outpost, Fort Yuma, at least until 1852. Emigrants, moving west, however, were more apt to be settling in southern California as farmers or ranchers instead of prospecting for mineral resources.

Desert Land Act, Entrymen, and Homesteading

Anglo-American homesteading and settlement in the Chuckwalla Valley was dependent upon the access to groundwater. The first known documented well was that of Hank Brown, mapped as early as 1856, apparently excavated for use by the Department of Interior's General Land Office survey to establish the San Bernardino Base Line and Meridian through the then uncharted area. Washington, the surveyor noted the well was 45 feet deep and provided good water (about one mile west of the project site) within Township 5 South and Range 16 E, northwest quarter of Section 10 (General Land Office, Plat Map 1856), near the present day airfield northeast of Desert Center (about five miles northwest of the project site). Brown reportedly blazed a wagon road for the boundary surveys up Salt Creek Pass between the Orocopia and Chocolate Mountains and on toward present-day Desert Center (Warren and Roske 1981, p. 17 as cited in the CEC RSA, 2010).

Some twenty years later, Congress, to encourage and promote economic development of the arid public lands of the West, passed the Desert Land Act in 1877. Through this act, individuals could apply for entry onto public lands that could not produce a paying crop without artificial irrigation. After four years demonstrating proof of reclamation and improvements, desert entrymen would gain title to the land.

Brown's offspring, Floyd Brown, was probably one of the earliest participants in the desert land entry program. It does not appear that many others joined him until a quarter century later. In 1908, a subsidiary organization to the Edison Light and Power Company of Los Angeles, the

[5] http://www.yumaheritage.com/history.html

Chuckwalla Land and Power Co., obtained a number of claims on the California side of the Colorado River north of Parker with the intent of building a dam to generate power and irrigate the Chuckwalla Valley, 40 miles to the west.[6] By the following year, practically all the land in the valley was taken, either by purchase, desert claim, or homestead under the encouragement offered by the development company. The Santa Fe Railroad even had plans to build from Palo Verde through the heart of the valley (Los Angeles Herald 1910 as cited in the CEC RSA, 2010). Unfortunately, the Department of the Interior was of the opinion that it was a promoter's pipe dream and refused to sanction the scheme.[7]

Four years later, the California Conservation Commission reported to the Governor and Legislature that while the power and irrigation project had been abandoned by the Chuckwalla Development Company, a group of 410 desert entrymen had formed the Chuckwalla Valley and Palo Verde Mesa Irrigation Association to proceed with the project independently (California Conservation Commission 1913 as cited in the CEC RSA, 2010). Most of these men were facing forfeiture of their lands and a loss on their investments, not being able to show final proof of securing water. The Senate and House Committees on Public Lands, recognizing their hardship, passed legislation granting them an extension (an exemption from cancellation for a period of one year) to give them time to carry out their plans (U.S. House of Representatives 1913 as cited in the CEC RSA, 2010). The Chuckwalla relief act benefited 780 entrymen, nearly 100 of whom were situated within the project vicinity.

In 1909, at the start of the land rush, Brown's well was reportedly 300 feet deep, and plainly visible from the road, with two adobe buildings and a corral near it (Mendenhall 1909 as cited in the CEC RSA, 2010). A couple of years later, a man named Peter S. Gruendike settled in the valley not far west of the project site (Wharton 1912 as cited in the CEC RSA, 2010). Gruendike's well is in the same general vicinity of Brown's and may be one-and-the-same. Gruendike was an active entryman, publishing an account of his Mountain View Experimental Ranch in Out West in 1911. By then, he had a good 10-foot-tall windmill in working order and a large tank, along with many kinds of trees planted and 300 or more palms of different kinds. At the time, he was very enthusiastic regarding the future outlook, having visions of growing hay, grain, melons, grapes, dates, cotton, and all citrus fruits. His land was patented in 1916.

Stephen Ragsdale, a cotton farmer from Palo Verde Mesa, acquired Gruendike's property in 1915 and began operating a towing business at the establishment. Six years later, when Route 60 opened a mile or so to the north, he uprooted and founded the tiny settlement of Desert Center, midway between Indio and Blythe.[8] Desert Center, at that time, consisted of a café with an attached gasoline station, a towing service/repair garage, a market, post office, several cabins for travelers, and a swimming pool. In addition to supporting tourism by providing sparse amenities for travelers, the local farming community, and a couple of mobile home parks.

6 *Imperial Valley Press*, February 27, 1909, September 17, 1910.
7 *Imperial Valley Press*, June 3, 1911.
8 http://en.wikipedia.org/wiki/Desert_Center,_California

Desert Driving and Automobile Roads

Automobiles began seriously replacing buckboards (four-wheeled wagons drawn by a horses or mules) about 1910.[9] Because of bad roads, the high-centered Model-T became the vehicle of choice. At that time, no maps, road signs, or service stations existed. Venturesome motorists in Southern California, faced with these circumstances, banded together in 1900 to form a touring club and began publishing a monthly magazine with tips on travel and directions to popular destinations (Von Till Warren 1980, p. 92 as cited in the CEC RSA, 2010). As desert driving could be perilous, motorists began advocating for better information and road assistance. In 1917, the U.S. Geological Survey erected signs directing travelers to water at 167 localities in California's desert (Thompson 1921 as cited in the CEC RSA, 2010). The California Department of Engineering, after paving its first auto road in 1912, began issuing maps in 1918 (Von Till Warren 1980, p. 92 as cited in the CEC RSA, 2010).

In 1915, the Chuckwalla Valley Road was essentially ninety miles of blow sand and cross washes with a couple of ruts. It was not until 1936 that U.S. Highway 60-70 between Indio and Blythe was paved (Norris and Carrico 1978 as cited in the CEC RSA, 2010). In 1968, this highway became Interstate 10 (I-10), a major transportation corridor through the Chuckwalla Valley today, connecting Los Angeles and Phoenix. Most other roads in the area remained unpaved.

Canals and Capital, Irrigation in the Colorado Desert

The paucity of water in the desert prior to irrigation made agriculture a challenge. Plans to improve matters began as early as 1880s. Thomas Blythe, an investor from San Francisco, bank rolled the construction of a canal in the Palo Verde Valley,[10] forty miles east of the project site. The water, taken from a swamp area called Olive Lake, was used to irrigate pasturelands and small agricultural plots. With Blythe's death in 1883, no further agricultural development in the valley occurred until the turn of the century. In 1904, the Palo Verde Land and Water Company purchased the Blythe Estate and began the task of constructing additional canals and intake structures. As previously mentioned, the desert entrymen formed the Chuckwalla Valley and Palo Verde Mesa Irrigation Association in 1913. Flood damages inflicted by the Colorado River, however, necessitated the formation of the Palo Verde Joint Levee District in 1917. The Palo Verde Drainage District was later established in 1921.[11] Two years later, the state legislature was petitioned to pass the Palo Verde Irrigation District Act in order to better administer both irrigation and drainage functions.

Although schemes to appropriate Colorado River waters began as early as 1859, the first major canal, the Alamo, was not constructed until 1901 (Harrington 1962 as cited in the CEC RSA, 2010). It conveyed water to the Imperial Valley for two years before becoming choked with silt (Von Till Warren 1980, p. 99 as cited in the CEC RSA, 2010). A temporary measure to bypass the blocked areas resulted in disaster when a spring flood in 1905 diverted the whole river into the Salton Sink, creating the body of water known today as the Salton Sea. The task of turning the

9 http://www.dustyway.com/2008/12/desert-driving-in-early-days.html
10 http://www.pvid.org/History.html
11 It is not clear whether the desert entrymen were involved in the formation of the drainage district.

river back into its main channel was extremely difficult and complicated by the fact that the canal had been built on both sides of the U.S.-Mexican border making the repair an international effort. In response to this disaster, the California Irrigation District Act was passed in 1911. The Imperial Irrigation District was subsequently formed to straighten out the mess, acquiring the properties from the bankrupt irrigation company.

In the first decade of the twentieth century, farmers in the Coachella Valley, west of the project site relied solely upon groundwater from artesian wells, planting extensive dates, figs, and grapes (Von Till Warren 1980, p. 98 as cited in the CEC RSA, 2010). By 1918, however, the water table had become seriously depleted. The Coachella Valley County Water District was subsequently formed to promote water conservation and control distribution. With completion of a new and improved “All-American Canal” to irrigate the Imperial Valley in 1940, communities in the Coachella Valley began forming plans to tap into it. The Coachella Canal, 122 miles long, was built nine years later.

The Colorado River Aqueduct is a water conveyance structure operated by the Metropolitan Water District of Southern California. It impounds water from the Colorado River at Lake Havasu on the California-Arizona border west across the Mojave and Colorado deserts to the east side of the Santa Ana Mountains. Its construction, between 1933 and 1941, required an army of 5,000 men. It is recognized as one of the engineering marvels of the modern world and was nominated as a National Historic Engineering Landmark by the American Society of Civil Engineers.[12], A portion of this aqueduct tunnels through the Coxcomb Mountains north of the Chuckwalla Valley and the project site.

Hydroelectric Power Transmission

During the late 19th century, history was made generating and transmitting electricity in Southern California’s Inland Empire.[13] Pioneer engineers and entrepreneurs took the industry’s first steps toward large-capacity power plants and long-distance power transmission nearly 125 years ago. Charles R. Lloyd and Gustavus Olivio Newman built California’s first hydroelectric power plant in western Riverside County in 1887. It relied upon water from a canal in Highgrove at the base of a 50-foot elevation drop. It began by powering 30 outdoor arc lights (15 in Colton and 15 in Riverside) from a direct-current dynamo (Powers 2009 as cited in the CEC RSA, 2010).

In the early 1890s, direct current (DC) relied upon a distributed system involving many power plants and numerous short transmission lines because it was not practical to vary the voltage to meet differing consumer requirements for lighting and motorized appliances. Further, DC systems were inefficient because low-voltage transmission necessitated conveyance of high-currents through resistive conducting wires resulting in large energy losses. In contrast, Alternating current (AC) relied upon a centralized system involving fewer power plants, long-distance transmission lines, and transformers to step down the voltage, essentially enabling the conveyance of high-voltages at low-currents, thereby reducing resistance and energy loss.

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[12] http://www.mwdh2o.com/mwdh2o/pages/about/history4.swf
[13] http://www.edison.com/files/backgrounder_mtview_historic.pdf

In September of 1893, while the dominant electric companies were fighting over the emerging electric power standards (DC versus AC), the small community of Redlands, in San Bernardino County, managed to engineer and complete the first commercially viable power plant in the United States (Myers 1983; Hay 1991 as cited in the CEC RSA, 2010). With the foresight of Almarian Decker, long-distance electric power transmission was achieved via transformers and the development of a revolutionary three-phase AC generator. Decker's power generation and delivery system was so successful that it became the Southern California standard.

Hydroelectricity, referred to as "white coal," was a clean and inexpensive source of power that enabled industrial capitalism to take hold in the West (Teisch 2001 as cited in the CEC RSA, 2010). Engineers began to dam western rivers for electricity in the 1890s, just as the hydraulic mining industry declined. Citizens, politicians, and reformers viewed electricity as a necessity that would dramatically uplift the country's standard of living. Water and power companies like Edison Light and Power Company of Los Angeles (later known as Southern California Edison), seeing big money, made every effort to control the stakes.

Before 1913, the highest voltage lines in the Los Angeles area were operated in the 10–75-kV range. Some of the earliest distribution lines were built to serve rural communities (Taylor 2005 as cited in the CEC RSA, 2010). During the 1930s, any circuits built were those that extended lines constructed a decade earlier. Many of these lines focused on following railroad spur lines and existing distribution lines to growing communities.

The first electricity came to Blythe in 1917. Two 50-watt diesel engines generated power 18 hours a day. It was not until 1930 that this system was abandoned when a 70-mile-long transmission line was constructed connecting Blythe with Calipatria in the Imperial Valley, where the line's main system was located. In the 1950s, the Blythe-Eagle transmission line was constructed. It was a 161-kV transmission line that connected the Blythe-Eagle Mountain Substation in Blythe to a substation near Eagle Mountain (Williams 2009; Myers 1983 as cited in the CEC RSA, 2010). The other transmission line in the vicinity of the project is the Palo Verde-Devers line, a 500-kV lattice tower transmission line constructed in 1982. It connects a plant in Arizona with a substation near Palm Springs.

Mining

Riverside County is known mostly for its sporadic, small-scale mining of gold, silver, lead, copper, uranium, fluorite, and manganese.[14] The following summary is derived from Shumway et al (1980), who provide an overview of mining in the region, focusing on areas relevant to the project area as cited in the CEC RSA, 2010.

Large numbers of prospectors were attracted to the region during the gold boom in La Paz (in western Arizona, approximately six miles north of present-day Ehrenberg) in 1862. Not long after, miners began combing the mountains on either side of the Chuckwalla Valley. Gold was being mined as early as 1865 in the Eagle Mountain District northwest of the project site. Much

[14] Exceptions include sizeable sustained mining operations at Midland for gypsum and in the Eagle Mountains for iron.

later, in the late 1940s, Kaiser Steel began a large-scale iron ore mining operation in the Eagle Mountains. In the Granite Mountains to the north-northwest, there was a short stint of gold mining beginning in 1894, followed by a resurgence in the late 1920s by the Chuckwalla Mining and Milling Corporation. Copper mining occurred in the Palen Mountains to the northwest during the second decade of the twentieth century, by the Fluor Spar Group, Homestake Group, Crescent Copper Group, Orphan Boy, and Ophir mines. Most of these mines were abandoned by 1917 (California State Mineralogist 1919 as cited in the CEC RSA, 2010).

The short-lived Pacific Mining District was established in 1887, in the Chuckwalla Mountains, south of the project site, following gold and silver discoveries that caused the most substantial rush to Riverside County in its history. Sixty claims were filed by the end of the year, but the boom fizzled by 1890 because the owners never had enough capital to work them properly (California State Mineralogist 1890 as cited in the CEC RSA, 2010). About 1898, some 40 claims in the area were taken up by the Red Cloud Mining Company. In 1901, a force of 50 men worked there. The company installed a new hoist and a 30-ton mill, and was raising money through stock offerings to construct a tram from the mine to the mill. The company changed hands some time before 1915, however, and soon folded. Just prior to this, half-a-dozen prospectors began working the Chuckwalla Placer Diggings near Chuckwalla Springs, three miles south of the project site. This lasted about fifteen years. The Red Cloud Mine was later resurrected, in 1931, when a small amalgamation plant was built, and continued operations until 1945.

Military Activities

Desert Training Center

In 1942, during World War II, Gen. George S. Patton established the Desert Training Center/ California-Arizona Maneuver Area (DTC/C-AMA) in a sparsely populated region of southeastern California, Arizona, and Nevada. Its purpose was to prepare tank, infantry, and air units for the harsh conditions of North Africa, practicing maneuvers, developing tactics, and field testing equipment (Meller 1946 as cited in the CEC RSA, 2010). The installation, in operation for two years (until the end of the war), was 16,000 square miles in extent. It was the first simulated theater of operations in the United States. Its location was chosen for its unforgiving desert heat, rugged terrain, available telephone communications system, and accessibility by established railroads and highways (Henley 1992, pp. 5–7; Howard 1985, pp. 273–274 as cited in the CEC RSA, 2010).

Seven camps were established for divisional use. Camp Young, near Indio, served as the main headquarters (Crossley 1997 as cited in the CEC RSA, 2010). Camp Desert Center was located between Chiriaco Summit and the community of Desert Center in T5S/R14E, Sections 26, 28, 30, 32, and 34; and T4S/R15E, Sections 1-15, 17, 18, 22, and 30-34 (Ickes 1942, pp. 1–2, as cited in Bischoff 2000, p. 58 as cited in the CEC RSA, 2010). It encompassed 34,000 acres, consisting of an encampment with temporary housing structures, an evacuation hospital, observers' camp, an ordnance campsite, quartermaster truck site, and maneuver area (USACOE 1993, p. 3 as cited in the CEC RSA, 2010). The Desert Center Army Airfield was situated just northwest of the community of Desert Center. It contained two paved runways, more than

40 buildings (officer's quarters, a mess hall, a dispensary, a headquarters building, a recreation hall, a link trainer building, a hangar, various supply buildings, an operations building, a power house, a pump house, a control tower), a well, and a 10,000-gallon water tower (Bischoff 2000, p. 93 as cited in the CEC RSA, 2010).

In 1986, BLM planned to nominate each of the seven division camps to the NRHP, to develop an interpretive program for the DTC/C-AMA, and to provide historical resources protection through designation as an Area of Critical Concern (ACEC) (Bischoff 2000, p. 134 as cited in the CEC RSA, 2010). Subsequently, Bischoff (2000, p. 133 as cited in the CEC RSA, 2010), in considering the historical and archaeological contexts for the DTS/C-AMA, found that it was a historically significant resource under all four criteria of the NRHP. As such, he recommended that the facility be nominated to the NRHP as a discontiguous district of clearly functionally and temporally related resources. He further proposed that the facility be recorded as multiple properties consisting of contributing and noncontributing elements of the district. DTC/C-AMA can be thought of as an interconnected landscape of WWII training sites that are highly significant for their association with Gen. George S. Patton and for their contributions to our understanding of how American soldiers were trained during WWII.

Desert Strike

During the Cold War years, relations between the United States and the Soviet Union were fragile. While a campaign promoting the nonproliferation of nuclear weapons began in 1958, a treaty was not signed until 1970. Thus, amid worries of nuclear war, a two-week training exercise was launched in 1964, called Desert Strike. It involved over 100,000 men, 780 aircraft, 1,000 tanks, and 7,000 other vehicles along the banks the Colorado River and adjoining desert valleys ranging over 150,000 square miles of California, Nevada, and Arizona (Garthoff 2001, p. 199; Nystrom 2003 as cited in the CEC RSA, 2010). Four Army divisions, three Army Reserve and National Guard brigades, and fifteen tactical Air Force squadrons took part.

The exercise was a two-sided enactment, with fictitious world powers "Calonia" and "Nezona" sharing a common border at the Colorado River. The premise of the conflict between these two entities, each led by a Joint Task Force, was a dispute over water rights. Major tactical operations during the exercise included deep armored offensive thrusts, defensive operations along natural barriers, counterattacks including airmobile and airborne assaults, and the simulated use of nuclear weapons. The Air Force provided fighter, air defense, interdiction, counter-air reconnaissance, and troop carrier operations in support of both joint task forces (Desert Strike n.d., p. 316 as cited in the CEC RSA, 2010).

In the first phase of Desert Strike, Calonia initiated mock battle with a full-scale invasion of Nezona. A new concept for military river crossings was put into operation during this invasion, accomplished with a combination of assault boats, amphibious armored personnel carriers, ferries, bridges, and fords at eight major sites along a 140-mile stretch of the Colorado River. The practice of attack and counterattack continued into a second phase, in which simulated nuclear strikes and airborne assaults were traded between the forces. Heavy equipment, such as the M60 tank, was used during practice maneuvers, and the track marks can still be seen across the desert (Prose and Wilshire 2000 as cited in the CEC RSA, 2010).

Cultural Resources Inventory

This subsection provides the results of cultural resource inventories for the project, including literature and records searches (California Historical Resources Information System (CHRIS) and local records), archival research, Native American consultation, and field investigations.

Background Inventory Research

To compile information on known cultural resources and previously conducted cultural resources studies pertinent to the location of the project, records searches were conducted at the Eastern Information Center (EIC, part of the CHRIS) at the University of California, Riverside. This study area was of the project footprint and a one-mile buffer around the archaeological Area of Potential Effects (APE[15]), exclusive of the transmission route. A supplemental records search was performed to cover the transmission corridor and a half-mile buffer area.

CHRIS Records Search

Twelve previous studies have been conducted within the study area (including the buffer area outside the APE). These are summarized in Appendix F, Cultural Resources Table 1. Less than 1 percent of the APE had been previously surveyed.

Four studies, related to Southern California Edison's Palo Verde-Devers Transmission Lines, were conducted north of the APE (Cowan and Wallof 1977; Wallof and Cowan 1977; Westec Services, Inc. 1982; Wilson 2009 as cited in the CEC RSA, 2010). These same four studies reported on a linear corridor south of the APE. Three additional linear studies, south of the APE, include two along I-10 related to a pipeline project and a safety project (Greenwood 1975; Hammond 1981 as cited in the CEC RSA, 2010) and a fiber optic project along Chuckwalla Road (Underwood et al. 1986 as cited in the CEC RSA, 2010). Several localized surveys, scattered both in and out of the APE, relate to geotechnical boring and pole replacement projects (Crew 1980; BLM 1980; Schmidt 2005 as cited in the CEC RSA, 2010). The remaining investigations include a survey along Corn Springs Road (Martinez et al. 2008 as cited in the CEC RSA, 2010) and a reconnaissance along the dunes on the southeast edge of Palen Dry Lake (Ritter 1981 as cited in the CEC RSA, 2010).

Previously Recorded Resources

Twelve previously recorded resources were identified within the study area, seven historic-period and five prehistoric archaeological sites (see Appendix F, Cultural Resources Table 2). Only one resource, a segment of historical Chuckwalla Road, crosses a portion of the archaeological APE

[15] The APE is defined in the regulations implementing the National Historic Preservation Act, and is the area within which an undertaking could directly or indirectly alter the character or use of historic properties (Title 36 CFR Part 800.16(d)).

(P-33-17766). The remaining six historical archaeological resources include four early-twentieth-century tin can scatters and two isolates (a tin can and a 1940s general infantry periscope-style flashlight).

Five prehistoric resources were identified outside the APE. These included: a remnant of a foot trail (CA-Riv-893T); a pottery sherd scatter (P-33-14160); a rock ring (P-33-14177); and an isolated quartz biface fragment (P-13591). One very large seasonal campsite, CA-Riv-1515, was identified and recorded by Ritter and Reed (1981 as cited in the CEC RSA, 2010) prepared an Area of Critical Environmental Concern (ACEC) management plan and environmental assessment for Palen Dry Lake and CA-Riv-1515. The ACEC is situated adjacent to the project site in an area encompassing 5.3 square miles. Further afield, outside the CHRIS study area, Gallegos et al. (1980 as cited in the CEC RSA, 2010) discuss two other prehistoric sites near Palen Dry Lake, found during a cultural resources inventory of the Central Mojave and Colorado Desert regions (no numerical designations were assigned). Typical archaeological remains underlying the dunes in that vicinity include tools of basalt and chert, flakes of chalcedony and obsidian, and pottery sherds (Gallegos et al. 1980, p. 106 as cited in the CEC RSA, 2010). Notes associated with a collection of about 300 artifacts from these sites are archived at the University of California Los Angeles.

A major aplite toolstone quarry (CA-Riv-1814) was found during investigations in 1980 (Singer as cited in the CEC RSA, 2010). It was determined eligible for the NRHP. Also recorded during that study was a very large site (CA-Riv-1383) spread over 45 acres. This site was also determined eligible for the NRHP.

Archival and Library Research

Along with conducting the records search, the General Patton Memorial Museum and the Palo Verde Historical Museum and Society were visited in order to learn more about regional history. The General Patton Museum is located at Chiriaco Summit near Desert Center and contains information about the Desert Training Facility and other military history related to the project area. The Palo Verde Museum, in Blythe, houses information on the history of the region, focusing heavily on the development of the Blythe community, as well as a comprehensive collection of local periodicals.

Other archival research was also performed, including the examination of historic topographic maps including: Chuckwalla Mountains (1:50,000 scale, 1947); Sidewinder Well (1:62,500 scale, 1952); Palen Mountains (1:48,000 scale, 1943); and Hopkins Well 1:48,000, 1943). In addition, other historic maps were accessed online from California State University, Chico, and the University of Alabama. Also reviewed were maps from the Malcolm Rogers collection on file at the Museum of Man in San Diego.

In addition, the University of California, Davis Shields Library was visited, and on-line searches for historic maps depicting the project area were completed. The following maps were examined:

1. Beale (1861), Map of Public Surveys in California, Scale 1:1,140,000.

2. American Photo-Lithographic Company (1865), California, Scale 1:5,069,000.
3. Asher and Adams (1872), California and Nevada- South Portion, Scale 1:1,267,000.
4. Williams (1873), Map of California and Nevada, Scale 1:3,485,000.
5. Colton (1873), Colton's California and Nevada, Scale 1:2,091,000.
6. Mitchell (1875), Map of the State of California, Scale 1:2,408,000.
7. Hardesty (1882), Map of California and Nevada, Scale 1:2,000,000;
8. Hardesty (1883), Map of Southeastern California, Scale 1:1,140,000.
9. Rand McNalley (1884), California, Scale 1:2,028,000.
10. Punnett Brothers (1897), Map of the State of California, Scale 1:2,218,000.
11. Rand McNalley (1897), California, Scale 1:1,190,000.
12. U.S. Geological Survey (1914), Lithologic Map of California, Scale 1:2,000,000.
13. Smith (1916), Geological Map of the State of California, Scale 1:760,320.

Archival and Library Research Results

Historical data was acquired on the project vicinity, but no additional cultural resources were identified in or near the project APE (Tennyson and Apple 2009 as cited in the CEC RSA, 2010). Additional historical information was assessed from the University of California Davis library and documents available online.

Local Agency and Organization Consultation

Various local historical societies, museums, and research institutions were contacted to request information for the project footprint and surrounding area. The following institutions were contacted by both formal letter and follow-up phone calls: General Patton Memorial Museum; Historic Resources Management Programs, University of California, Riverside; Palm Springs Historical Society; Palo Verde Historical Museum and Society; and Riverside County Historical Commission. The Bureau of Land Management's (BLM) Palm Springs-South Coast Field Office also had General Land Office (GLO) plat maps that informed this analysis, particularly concerning desert land entries, and various survey reports.

Local Agency and Organization Consultation Results

No responses were received from the various historical societies, museums, and research institutions contacted.

Native American Consultation

The Native American Heritage Commission (NAHC) maintains two databases to assist in identifying cultural resources of concern to California Native Americans. The NAHC's Sacred Lands database has records for places and objects that Native Americans consider sacred or otherwise important, such as cemeteries and gathering places for traditional foods and materials. The NAHC Contacts database has the names and contact information for individuals, representing a group or themselves, who have expressed an interest in being contacted about development projects in specified areas.

The NAHC was contacted to request a list of local Native Americans who might have concerns about the project and a search of the Sacred Lands Files for any known resources that might be affected by project impacts. The NAHC responded, indicating that one resource is located within a 1.0 mile radius of the project [believed to be archaeological site CA-Riv-1515]. The NAHC also provided a list of individuals representing local Native American communities.

Appendix F, Cultural Resources Table 3 provides a list of Native Americans contacted their affiliations, and responses, if any. Among those contacted were individuals from the Luiseño (Pauma Valley Band), Cahuilla (Cahuilla Band, Agua Caliente Band, Torres-Martinez Band, Ramona Band, Morongo Band), Serrano (San Manuel Band and Morongo Band), Mojave (Fort Mojave AhaMaKav Cultural Society and Colorado River Indian Tribes), and the Chemehuevi (Twentynine Palms Band and Chemehuevi Reservation, Colorado River Indian Tribes) tribes. Follow-up phone calls were made with all identified Native American groups/individuals.

With the Applicant's filing of the application for a right-of-way grant, the BLM initiated formal, government-to-government tribal consultation pursuant to the NHPA as well as other laws and regulations. The NAHC was contacted by letter about the project, and provided a list of Native American contacts. BLM initiated Section 106 consultation in the early stages of project planning by letter in July 2009. To date, twelve tribes have been identified and invited to consult on this project, as listed below. Tribes were also invited to a general information meeting and proposed project site visit, held on January 25, 2009.

On February 10, 2010, the BLM met with the Ft. Yuma Quechan Tribal Council. The BLM provided information on several solar energy projects, including the project, and answered questions.

Letters requesting consultation among tribes, the California Energy Commission, the applicant, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation to develop a cultural resources Programmatic Agreement (PA) for the PSPP were mailed out to the below-listed tribes on March 3, 2010.

1. Ramona Band of Mission Indians
2. Torres-Martinez Desert Cahuilla Indians
3. Augustine Band of Cahuilla Mission Indians
4. Agua Caliente Band of Cahuilla Indians
5. Morongo Band of Mission Indians
6. Twentynine Palms Band of Mission Indians
7. Ft. Yuma Quechan Indian Tribe
8. Colorado River Indian Tribes
9. Chemehuevi Reservation
10. Colorado River Reservation
11. San Manuel Band of Mission Indians
12. Quechan Indian Tribe
13. Fort Mojave Indian Tribe

An initial meeting regarding the PA was held on April 23, 2010, in Palm Desert, to which all interested tribes were invited. Tribes were also notified of a workshop on the SA/DEIS for the proposed action, held on April 29, 2010, in the BLM Palm Springs-South Coast Field Office, where BLM also held an informational meeting for the tribes on May 25, 2010. The BLM issued a draft cultural resources PA for the PSPP on June 17, 2010, allowing 30 days for public and Native American comment. Most recently, BLM held a meeting in Palm Desert on August 11, 2010, to review and discuss the revised draft PAs for the PSPP and the two other nearby proposed solar projects, and some Native Americans were in attendance. At this meeting, representatives of Californians for Renewable Energy (CARE) and of La Cuna de Aztlan Sacred Sites Protection Circle expressed concern over geoglyphs and other sacred sites and ancient trails that could be affected by solar development in the Chuckwalla Valley and on Palo Verde Mesa.

Results of Inquiries Made to Native Americans

Few comments from Native Americans have been received to date. The Luiseño Council Member requested continued consultation by email on July 10, 2009. As a result of the consultation efforts made to date, Native Americans have identified no additional cultural resources that could be impacted by the project.

The BLM is in ongoing discussions with various tribes pursuant to the cultural resources PA for the PSPP. A log of BLM's consultations with specific individuals and groups is provided in Appendix I of the PA for the PSPP signed October 7, 2010. The following tribes participated in the PA: Morongo Band of Mission Indians, Ramona Band of Mission Indians, Fort Yuma Quechan Indian Tribe, San Manuel Band of Mission Indians, Torres-Martinez Desert Cahuilla Indians, Fort Mojave Tribal Council, Twentynine Palms Band of Mission Indians, Agua Caliente Band of Cahuilla Indians Augustine Band of Mission Indians, Chemehuevi Tribal Council, And Colorado River Tribal Council. Native American comments and recommendations are addressed in Section 5.5, *Public Comment Process* and will be addressed in the PA for the PSPP.

Field Inventory Investigations

Class III cultural resource inventories of the project APE were conducted in several stages:

1. The main project footprint and originally proposed transmission line/substation locations were surveyed by AECOM April 13–May 6, 2009, and October 14–26, 2009 (Tennyson and Apple 2009; AECOM EDAW 2009a as cited in the CEC RSA, 2010);
2. Portions of a new transmission line and transmission line alternative were surveyed by AECOM in May, 2010(CEC RSA, 2010);
3. Other portions of the new and alternative transmission line routes, the new and alternative substation locations, and the alternative substation access road route were surveyed in 2010 by ECORP for the Desert Sunlight Project.(ECORP 2010).

Results of Class III Cultural Resource Inventory

A total of 64 archaeological sites and 298 isolates were found during the field inventories. These included 9 prehistoric and 54 historic-period archaeological sites and one built-environment transmission line dating from the 1950s (Tennyson and Apple 2009, pp. 57–124; AECOM EDAW 2009a, pp. 15–17as cited in the CEC RSA, 2010). These are classified and summarized below.

Prehistoric Resources

Nine prehistoric sites were identified during field inventories, including five sparse lithic scatters, and four sparse lithic and fire-affected rock (FAR) scatters containing minor quantities of additional artifacts/ecofacts including ground stone fragments of manos and metates, hammerstones, battered cobbles, choppers, scrapers, and bifaces, and marine shell (see Appendix F, Cultural Resources Table 4).

Historic-Period Resources

Historic-period resources include 54 sites, 35 of which are refuse scatters dating from the 1880s to 1950s (most originating between 1920s and 1940s), composed primarily of tin cans and minor amounts of glass fragments (see Appendix F, Cultural Resources Table 5). Two of these scatters are adjacent to WWII tank tracks but associations have not been established. The refuse scatters include food cans, tobacco tins, bottles, jars, oil cans, and automobile parts. The remaining 19 sites include 3 other segments of tank tracks, 3 possible placer mining claims, 2 survey markers, 1 corral, 1 road, 5 prospecting quartz reduction loci, and 4 rock cairn features.

Cultural Landscapes

Cultural landscapes are geographic areas associated with historic events or activities, or that exhibit other cultural or aesthetic values. They reveal aspects of our country’s origin and development through their resources, forms and features. The designation can be useful planning tools for managing historic, prehistoric and ethnographic resources. Some cultural resources in the project site may be contributing elements to potential cultural landscapes. The PA developed for the PSPP addresses the designation of cultural landscapes in relation to cultural resources affected by the project. Using a “landscape approach” to characterize groups of related cultural resources in the APEs, two potential cultural landscapes could be described as follows:

Prehistoric Trails Network Cultural Landscape

A Prehistoric Trails Network Cultural Landscape would consist of the Halchidhoma Trail through the Chuckwalla Valley and the associated joining and diverging trails (and trail-related features such as pot drops and rock cairns), and the varied loci of importance to prehistoric Native Americans that these trails connected. These loci included springs (and the dry lakes when they were not dry), food and materials resource areas, and ceremonial sites (geoglyphs, rock alignments, petroglyphs). The Halchidhoma Trail (CA-Riv-53T) does not run through the project site, but possible contributors to this potential cultural landscape within the project site include sparse lithic scatters and sparse lithic and FAR scatters. Immediately north of the APE, additional prehistoric sites were recorded that were later determined to be outside the current APE. These could also be included as part of a potential cultural landscape.

Other contributors to this potential landscape, outside the APE, could include:

1. CA-Riv-1383 (a 45-acre site west of the project site, with 170 petroglyphs, 3 trail segments, sparse lithic scatters, cleared rock circles, and other features);
2. CA-Riv-1814 (a major aplite quarry west of the project site);
3. P-33-14177 (a cleared circle south of the project site); and
4. CA-Riv-1515 (an extensive elongated scatter of cultural materials southeast of the project site).

Desert Training Center/California-Arizona Maneuver Area Cultural Landscape

Some of the refuse disposal sites within the project site date to World War II and relate to military activities. These have the potential to contribute to a broader DTC/C-AMA Cultural Landscape. Additional contributors to this potential landscape may be discovered during subsequent archaeological investigations and/or construction. Immediately north of the APE, a bivouac (SMP-H-RMA) was recorded with several cleared pads and tank tracks that were later determined to be outside the current APE. This site could also be included as part of a potential landscape.

Results of Survey for Built-Environment Resources. Field surveys were conducted for the built-environment in May 2009 and May 2010. Five resources were identified. These include: two wooden bridges built in 1931, a transmission line from the late 1950s, a school house dating to around 1935, and a complex of residential buildings and structures built between the 1920s and 1950s. These are referenced, respectively, as the Aztec Ditch Bridge (Caltrans Bridge 56C0102), the Tarantula Ditch Bridge (Caltrans Bridge 56C0103), the Blythe-Eagle Mountain 161-kV transmission line (SMP-H-1024), the Desert Center School House (P-33-6833), and SMP-B-MKM-001. With the exception of the transmission line, none are within the APE.

Summary of Identified Cultural Resources in the APE. A total of 64 cultural resources are present within the APE (not including isolated artifacts) either previously recorded or discovered during field investigations (Table 3.4-1). One historic structure and 63 archaeological sites are known. Of the archaeological sites, 9 are prehistoric and 54 are of the historic period. Of the prehistoric sites, 5 are sparse lithic scatters and four are sparse lithic and FAR scatters. Of the historical sites, 35 are refuse scatters (mostly cans dating to the 1920s–1940s), 3 are placer mining claims, and 2 are survey marker features. Additionally, 1 road, 1 corral, 3 sets of military tank tracks, 5 small prospecting quartz reduction loci, and 4 rock cairns were identified. Lastly, one electrical power transmission line is noted as a built-environment resource.

3.4.2 Determining the Historical Significance of Cultural Resources

A key part of any cultural resources analysis under NEPA and Section 106 of the NHPA is to determine which of the cultural resources that a proposed or alternative action may affect, directly or indirectly, are historically significant, Within the context of Section 106, historically significant refers to cultural resources that are listed on or eligible for listing on the National Register of Historic Places. Subsequent effects assessments are made for those cultural resources

TABLE 3.4-1
SUMMARY OF CULTURAL RESOURCES (PREVIOUSLY IDENTIFIED & NEWLY DISCOVERED) WITHIN THE APE

Archaeological	Prehistoric Sites	Lithic Scatters	5
		Lithic & FAR Scatters	4
	Historical Sites	Refuse Scatters	35
		Placer Mining Claims	3
		Survey Marker Features	2
		Roads	1
		Corral	1
		Military Tank Tracks	3
		Quartz Reduction Loci	5
		Rock Cairns	4
Built-Environment	Structures	Power Transmission Line	1
Total			**64**

that are determined to be historically significant. Cultural resources that can be avoided by construction may remain unevaluated if the values they possess are only informational in nature. Unevaluated cultural resources that cannot be avoided are managed for project purposes as historically significant and therefore eligible to the National Register of Historic Places under Section 106 when determining effects.

3.4.3 Evaluation of Historical Significance under NHPA Section 106

Cultural resources are considered during federal undertakings chiefly under Section 106 of the NHPA and its implementing regulations, 36 CFR Part 800. Properties of traditional, religious, and cultural importance to Native Americans are also considered under Section 101(d)(6)(A) of the NHPA.

The NHPA Section 106 process requires federal agencies to consider the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings (36 CFR § 800.1). Significant cultural resources (historic properties) are those resources, districts, sites, buildings, structures, or objects, that are listed in or are eligible for listing on the NRHP per the criteria listed at 36 CFR § 60.4 and presented below.

Per National Park Service (NPS) regulations, 36 CFR § 60.4, and guidance published by the NPS, National Register Bulletin, Number 15, How to Apply the National Register Criteria for Evaluation, different types of values embodied in districts, sites, buildings, structures, and objects are recognized. These values fall into the following categories:

1. Associate Value (Criteria A and B): Properties significant for their association with or linkage to events (Criterion A) or persons (Criterion B) important in our past.

2. Design or Construction Value (Criterion C): Properties significant as representatives of the man-made expression of culture or technology.

3. Information Value (Criterion D): Properties significant for their ability to yield important information about prehistory or history.

The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association. Cultural resources that are determined eligible for listing in the NRHP are termed “historic properties” under Section 106, and are afforded the same protection as sites listed in the NRHP.

NRHP determinations of eligibility have not yet been formally made for the cultural resources that might be affected by the project under any of the alternatives. BLM has informed all consulting parties in the Section 106 process what the agency’s proposed determinations will be and is currently seeking comments from the consulting parties on those determinations. Final determinations will be made in accordance with Section 106 or the PA that has been developed for the PSPP by the BLM in consultation with the California State Historic Preservation Officer, Indian tribes and other interested parties. Until NRHP eligibility determinations are formally made, the cultural resources potentially affected by the project will be assumed to be eligible for the purpose of assessing effects under all alternatives. The isolated artifacts found within the APE lack archaeological contexts and associations that would contribute meaningfully to an understanding of history or prehistory and are considered not eligible for listing in the NRHP.

3.5 Environmental Justice

Title VI of the Civil Rights Act of 1964 (Public Law 88-352, 78 Stat.241) prohibits discrimination on the basis of race, color, or national programs in all programs or activities receiving federal financial assistance.

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 agencies to achieve environmental justice as part of this mission (59 Fed. Reg. 7629, Feb. 16, 1994). 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.

The Council on Environmental Quality (CEQ) and EPA share oversight responsibility for the Federal Government's compliance with Executive Order 12898 and NEPA. The CEQ, in consultation with the EPA and other agencies, has developed guidance to assist Federal agencies with their NEPA procedures so that NEPA documentation effectively identifies and addresses environmental justice concerns. According to the CEQ's "Environmental Justice Guidance under the National Environmental Policy Act," agencies should consider the composition of the affected area to determine whether minority populations or low-income populations are present in the area affected by the proposed action, and if so whether there may be disproportionately high and adverse environmental effects (CEQ, 1997).

3.5.1 Minority Populations

The CEQ defines minority individuals as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population, for the purposes of environmental justice, is identified when the minority population of the potentially affected area is greater than 50 percent or meaningfully greater than the percentage of the minority population in the general population or other appropriate unit of geographical analysis (CEQ, 1997).[1]

Figure 3.5-1 shows the distribution of minority populations within a six-mile radius of the center of the project site. A six mile radius was selected as a maximum reasonable distance for identifying potential environmental justice communities of concern for the project. Beyond that distance, most direct physical effects would typically be expected to be relatively diminished and the residents' daily interaction with the project would likely be relatively limited.

1 According to the CEQ guidelines, "Minority" is defined as all persons except non-Hispanic whites. In order words, minority is defined as all racial groups other than white, and all persons of Hispanic origin, regardless of race.

As shown, the radius encompasses parts of census block group 458.00.6. The total population of the block group within the six-mile radius is 17 of which 10 are classified as Black or African-American, American Indian (or Alaskan Native), Asian, Native Hawaiian (or other Pacific Islander, some other race (including two or more races), and/or Hispanic or Latino).[2]
Table 3.5-1 presents the minority population composition of the six-mile radius of the project site, the nearby city of Blythe, and Riverside County as a whole. Riverside County as a whole exhibits a proportion of minority residents of 49 percent, which is lower than the City of Blythe and the area within six miles of the project site. The minority population within a six-mile radius of the project site as well as the City of Blythe as the whole is more than 50 percent. Therefore both the very local resident population and the City of Blythe are determined to represent a community of concern for the purpose of environmental justice analysis.

TABLE 3.5-1
RACIAL AND INCOME CHARACTERISTICS FOR RESIDENTS WITHIN THE ENVIRONMENTAL JUSTICE STUDY AREA

Geographic Area (Census Block Group)	Total Population	Total Minority (Percentage Minority)	Median Household Income (1999)	Proportion of the Population Living Below the Poverty Level (Percentage Low-Income)
Six-mile radius of PSPP	17	10 (58.8%)	--	--
Block Group 458.00.6	1,440	-- --	$27,404	28.3%
Blythe	12,155	7,050 (58%)	$35,324	20.9%
Riverside County	1,545,387	756,556 (49%)	$42,887	14.2%

NOTE: Persons living within a six-mile radius used to determine minority population. Persons living within the applicable Census Block Group used to determine low income population. See Footnote 2.

SOURCE: U.S. Census, 2000.

3.5.2 Low Income Populations

Unlike the CEQ (1997) guidance on minority populations, none of the environmental justice guidance documents contains a quantitative definition of how many low-income individuals it takes to comprise a low-income population. In the absence of guidance, for this analysis the density used to identify minority populations (i.e., 50 percent or greater) was also used as a minimum to identify low-income populations. In addition, for the purposes of the FEIR analysis a local population is judged to be “meaningfully greater” than the general population if the proportion of individuals living under the poverty line is 100 percent greater than that of the general population.

[2] To accurately map the affected population typically includes only U.S. census blocks that contain over 50 percent of the blocks’ geographic area within a six-mile radius of a proposed site. In the PSPP case, the census blocks surrounding the site are extremely large and capture populations that extend well beyond the six-mile radius. However, when using the same census blocks used to determine minority population, the low-income population would have accounted for zero persons. Therefore, the census data used to determine low-income population includes all census blocks intersected by the six-mile radius, regardless if over 50 percent of the blocks’ geographic area was contained within.

In this analysis, the current below-poverty-level population is based on Year 2000 U.S. Census block group data within a six-mile radius of the PPSP site. As shown in Table 3.5-1, the 2000 census data reported that the median household income for Riverside County was $42,887. The block group in which the Project is situated (Census Block Group 458.00.6) has a median household income at $27,404 and the highest proportion of residents below the poverty level– a proportion of low-income residents (28.3 percent) nearly twice that for Riverside County as a whole.

Consequently, it is conservatively judged that the Census Block Group 458.00.6 is identified as a low income population that represents a community of concern for the environmental justice analysis.

3.6 Lands and Realty

3.6.1 Introduction

BLM manages a diverse combination of lands and resources administered by BLM in eastern Riverside County, including, but not limited to, land uses for utility corridors, communication sites, land tenure (disposal, acquisition or easement) issues, land use authorizations (permits and rights-of-way), withdrawals and renewable energy activities. Within the immediate and surrounding areas of the project site, there are no communications sites, land use permits, leases or easements of record, nor are any land tenure issues identified in close proximity to or that would be affected by the project. There are, however, utility corridors, rights-of-way and renewable energy activities (Figure 4.1-1**)**, and a withdrawal application.

3.6.2 Background

Section 503 of Title V of the Federal Land Policy and Management Act of 1976, as amended, (FLPMA) required the establishment of corridors, to the extent practical, to minimize adverse environmental impacts and the proliferation of separate rights-of-way. Through its planning efforts, the Palm Springs-South Coast Field Office has designated corridors throughout the Field Office boundaries that generically are identified as "locally-designated corridors" and specifically are identified by an alphabetical reference.

Section 368 of the Energy Policy Act of 2005 directs the Secretary of the Departments of the Interior, Defense, Energy, Agriculture, and Commerce to designate corridors for oil, gas, hydrogen pipe and electric transmission lines on federal land in the 11 western states, perform necessary reviews, and incorporate those designations into land use, land management or equivalent plans. Implementing this section, the *Approved Resource Management Plan/Record of Decision for Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States* signed January 14, 2009, established corridors (generically identified as "368 corridors" and specifically identified by a numerical reference) pursuant to Section 368 of the Energy Policy Act of 2005.

Further, lands identified in the Notice of Availability of Maps and Additional Scoping for the *Programmatic Environmental Impact Statement to Develop and Implement Agency-Specific Programs for Solar Energy Development* (Solar Energy Development PEIS or PEIS) released by the Departments of the Interior and Energy identified Solar Study Areas determined to have high potential for development of solar energy facilities. As a result of release of these maps, the BLM filed an application for withdrawal with the Secretary of the Interior identifying 676,048 acres of land in Arizona, California, Colorado, Nevada, New Mexico and Utah to be "withdrawn from settlement, sale, location or entry under the general land laws, including the mining laws, on behalf of the BLM to protect and preserve solar energy study areas for future solar energy development." The Notice of Proposed Withdrawal, published June 30, 2009, in the Federal Register (74 Fed. Reg. 31,308), segregated certain lands for up to two years to provide time for various studies and analyses in support of a final decision on the withdrawal application. The lands remain open to discretionary actions, such as rights-of-way and land use permits, and to the mineral sales and leasing laws.

3.6.3 Existing Condition

The project site lies within land segregated by the above-referenced withdrawal application. The project area is BLM-managed public land classified as Multiple-Use Class M (Moderate Use) in the CDCA Plan. The project includes one 40-acre parcel of private land (APN: 810-110-007), the use of which is covered by Riverside County General Plan – Eastern Riverside County Land Use Plan, and Riverside County General "Open Space-Rural" land use policies LU 20.1, LU 20.2 and LU 20.4. Reconfigured Alternative 2 would involve two additional parcels of private land also designated in the Riverside County General Plan as "Open Space-Rural" (CEC RSA, 2010).

Interstate-10 lies within a 368 corridor identified as "Corridor 30-52, 2 miles in width" as well as within locally-designated Corridor K (2 miles in width); these corridors are shaded green along I-10 in Figure 4.1-1 and lie south of the project site on a generally east-west heading. Numerous other linear rights-of-way also lie within and to the north and south of these two designated overlapping corridors.

Southern California Edison's existing 161 kV Eagle Mountain-Blythe power line runs in a northwesterly direction across the southwest portion of the proposed project site.

The southern portion of the project site would lie within the northern portion of both designated corridors. The redundant telecommunications line, the fiber optic cable and the majority of the gen-tie line would lie wholly within Corridors K and 30-52.

Two alternative routes for the new 12.47 kV temporary distribution line to provide power during construction have been identified and analyzed in this PA/FEIS. The distribution line would either lie wholly or partially within the designated corridors, depending on the route selected.

Site access would be from an extension of Corn Springs Road at the I-10 interchange. Corn Springs Road currently runs north-south across I-10 and terminates just north of the I-10 overpass. From this dead-end, Corn Springs Road would be extended about 1,350 feet to the north to connect with a new access road running east into the project site. A second road with secured gate would be constructed from the northern edge of the I-10 right-of-way boundary to the southern portion of the solar plant site to provide emergency access. Both roads would lie within the northern portion of Corridors K and 30-52.

Several transmission line projects are, or are planned for, existing corridors. The Devers-Palo Verde No. 1 (DPV1) is an existing 500 kV transmission line which spans approximately 128 miles of land within California paralleling I-10: it is within Corridors K and 30-52. The Blythe 230 kV Transmission Line Project involves building two 230 kV transmission lines spanning approximately 70 miles between the Julian Hinds and Bucks substations, and construction of a new midpoint substation: it is within the existing federally-designated utility corridors along I-10. The Devers-Palo Verde 2 Transmission Line Project, approved by the CPUC in January 2007, involves the construction of two 500 kV transmission lines along the south side of I-10, parallel to the existing DPV1 transmission line route.

3.7 Livestock Grazing

As shown on Map 2-8 of the Approved Northern and Eastern Colorado Desert Coordinated Management Plan (BLM CDD, 2002), there are no livestock grazing allotments within or adjacent to the project area or right-of-way application area.

3.8 Mineral Resources

3.8.1 Geologic Environment

Depending on the published reference, the project site is located in either the eastern portion of the Mojave Desert geomorphic province, or the northeastern quarter of the Colorado Desert geomorphic province (CEC RSA, 2010), in the Colorado Desert in Riverside County, California. The region is more characteristic of the Mojave Desert geomorphic province in terms of geology, structure and physiography. The Mojave Desert is a broad interior region of isolated mountain ranges which separate vast expanses of desert plains and interior drainage basins. The physiographic province is wedge-shaped, and separated from the Sierra Nevada and Basin and Range geomorphic provinces by the northeast-striking Garlock Fault on the northwest side. The northwest-striking San Andreas Fault defines the southwestern boundary, beyond which lie the Transverse Ranges and Colorado Desert geomorphic provinces. The topography and structural fabric in the Mojave Desert is predominately southeast to northwest, and is associated with faulting oriented similar to the San Andreas Fault. A secondary east to west orientation correlates with structural trends in the Transverse Ranges geomorphic province.

The project site is situated on an alluvial fan within the northwest-trending Chuckwalla Valley between the Chuckwalla Mountains to the southwest, and the Palen Mountains to the northeast. Overall, the site slopes at very shallow grades north and northeast toward the local topographic low at Palen Dry Lake.

Quaternary age alluvial, lacustrine and eolian sedimentary deposits are mapped in the vicinity of the proposed site (CEC RSA, 2010). Marine and transitional sediments of the Pliocene Age Bouse Formation are presumed to underlie alluvial fan deposits, and metasedimentary bedrock of the McCoy Mountains Formation outcrop in the McCoy and Palen Mountains (CEC RSA, 2010). The local stratigraphy, as interpreted by numerous authors, is presented in Table 3.8-1.

Holocene units, which include eolian sands, younger alluvium, and playa lake deposits, are mapped over nearly the entire project site surface. Eolian sands consist of unconsolidated deposits of well sorted, wind-blown sand in dunes and sheets. Younger alluvium is composed of sand, pebbly sand and sandy pebble-gravel, and is generally coarser grained closer to mountain ranges. Desert varnish is not well developed in the mostly unconsolidated and undissected sediments. Playa lake deposits are also unconsolidated, and are comprised of clay, silt, and sand. Older alluvium is present at the surface along the northern edge of both the western (entire length) and eastern (west end only) portion of the project site. The exposures of older alluvium occur as north-south oriented ridges of material protruding into the site from the north, with the intervening areas occupied by drainages filled with younger alluvium. Older alluvium is composed of consolidated gravel and sand that is moderately dissected with moderately developed desert pavement and varnish.

TABLE 3.8-1
CORRELATION AND AGES OF STRATIGRAPHIC UNITS

Age	Unit/Description	Jennings (CDMG 1967)	Stone (USGS 1990)	Stone (USGS 2006)
Holocene	Alluvium of modern washes	Qal	Qw	Qw
	Alluvial-fan and alluvial-valley deposits		QTa	Qa$_6$
Holocene ± Pleistocene	Alluvial-fan deposits (Intermediate Alluvium)	Qc		Qa$_3$
Pleistocene	Alluvial deposits of Palo Verde Mesa			Qpv
Pleistocene ± Pliocene	Alluvial deposits of the McCoy Wash area	QP	QTfg	QTmw
Pleistocene ± Miocene	Alluvial-fan and alluvial-valley deposits (Older Alluvium)	Qc$_o$	QTdf	QTa$_2$
Pliocene ± Miocene	Bouse Formation[a]	Pu	Tbx	Tbx
Cretaceous and Jurassic?	McCoy Mountains Formation[b]	ms, mv	Km*(x)*, Kja, Kima?	Km*(x)*, Kja, Kima?

NOTES:
[a] Not mapped at the surface within the BSPP area and expected to present at depth below the alluvial-filled basin.
[b] Mapped only in a small portion at the southwest corner and expected to present at shallow depths near the McCoy Mountains.

SOURCE: CEC RSA, 2010 (Table 2)

Exploration drilling conducted in 1978 by the U.S. Geological Survey (USGS) resulted in two boreholes in the Palen Dry Lake area, one of which lies within the boundaries of the project solar field. U.S. Geological Survey Borehole PDL#1 was advanced to a depth of 505 feet below ground surface (bgs) near the north-central boundary of Section 27 near the northeast corner of the proposed project right-of-way. The lithologic log of PDL#1 indicates the subsurface near the northern site boundary is composed of moderately to thickly bedded sands, gravels, and clays to a depth of approximately 55 feet where a transition to overall clay dominated formation takes place and continues to the total depth of the borehole. The interbedded clays, sands, and gravels probably represent periods of primarily lakebed deposition interspersed with episodes of coarse sediment transport from the nearby Chuckwalla and Palen Mountains. A gravel dominated bed present from approximately 90 to 110 feet also attests to a period of clastic deposition during a period of primarily lakebed sedimentation (CEC RSA, 2010). A water exploration well, 06S/17E-03M01S, which was drilled in 1958 in what is now the southeast portion of the project site reportedly had a similar stratigraphic column with 48 feet of coarse alluvium overlying strata which are clay dominated to a depth of 818 feet bgs (CEC RSA, 2010).

A preliminary geotechnical investigation including 13 exploratory borings and eight test pits has been completed for the general area of the project site (CEC RSA, 2010). The preliminary geotechnical investigation reveals that the project site is underlain by alluvial and eolian deposits of Pleistocene through Holocene age, which consist of dune sands, alluvium and lake deposits to the depths explored (approximately 76.5 feet bgs). The project site is generally surfaced with unconsolidated soils due to desiccation and/or wind deposition to a maximum depth of 2 feet bgs. The soils below the surficial materials are generally medium dense to very dense poorly graded sand with varying amounts of silt, silty sand and clayey sand. Firm to very hard sandy clays are locally present as interbedded layers 5 to 10 feet thick at depths generally greater than 25 feet bgs. Near-surface site soils are primarily granular with no to low swell potential; however, potentially expansive soils were observed at the ground surface in the northeastern portion of the site (CEC RSA, 2010). Loose dune sand also was observed at the ground surface and at depth in the southwestern portion of the site (CEC RSA, 2010). Collapse potential tests indicate the site soils exhibit a collapse potential in the range of 0 to 3.0 percent when inundated with water.

The proposed solar fields are not crossed by any known active faults or designated Alquist-Priolo Earthquake Fault Zone (EFZ, formerly called Special Studies Zones). A number of major, active faults lie within 62 miles of the site. These faults are discussed in detail in Section 3.12, *Public Health and Safety*, under the Geologic Hazards heading. Several northwest-striking, south-dipping basement thrust faults are mapped at the extreme southern end of the Palen Mountains, and are inferred beneath Quaternary and Tertiary sediments in Chuckwalla Valley. The faults are part of a major Mesozoic terrain-bounding structural zone that was active during late Jurassic time, and are associated with folding and metamorphism in the Palen and McCoy Mountains. The basement faults are no longer active, and are not exposed anywhere on the surface of the proposed site.

Little is known regarding the depth to bedrock beneath the site. Gravity investigations indicate the Chuckwalla Valley overlies three alluvium filled sub-basins separated by east to northeast-trending subsurface basement ridges. Gravity data indicate basin fill in Chuckwalla Valley ranges from approximately 650 feet deep across faulted subsurface basement ridges to greater than 6,000 feet deep near the sub-basin centers. Analysis of gravity anomalies indicates the crystalline basement beneath the sediment filled basins is highly faulted and structurally complex. Review of gravity anomaly data suggests the project site is underlain at an undetermined depth by faulted tertiary non-marine and marine sedimentary, pyroclastic, and volcanic rocks.

The ground water level beneath the site was measured as part of Solar Millennium’s water resources investigation. Depth to water beneath the site in well 06S/17E-03M01S was reportedly 180 feet bgs on May 22, 2009. Subsurface exploration performed at the site encountered ground water at depths of 68 and 73 feet below existing grade; however, this occurrence of ground water is believed to be associated with perched conditions and not indicative of the true water table.

3.8.2 Mineral Resources Potential

Lands identified in the Notice of Availability of Maps and Additional Public Scoping for the *Programmatic Environmental Impact Statement to Develop and Implement Agency-Specific Programs for Solar Energy Development* (Solar Energy Development PEIS or PEIS) released by the Departments of the Interior and Energy identified Solar Study Areas determined to have high potential for development of solar energy facilities. As a result of the release of these maps, the BLM filed an application for withdrawal with the Secretary of the Interior identifying 676,048 acres of land in Arizona, California, Colorado, Nevada, New Mexico and Utah to be "withdrawn from settlement, sale, location or entry under the general land laws, including the mining laws, on behalf of the BLM to protect and preserve solar energy study areas for future solar energy development." The Notice of Proposed Withdrawal, published June 30, 2009 in the Federal Register (Vol. 47 No. 124), segregated certain lands for up to two years to provide time for various studies and analyses in support a final decision on the withdrawal application. The lands remain open to discretionary actions, such as rights-of-way and land use permits and to the mineral leasing laws.

As described in the RSA for the project, the project site is mapped as Mineral Resource Zone (MRZ)-4. This classification identifies "areas of no known mineral occurrences where geologic information does not rule out either the presence or absence of industrial mineral resources." No economically viable mineral deposits are known to be present at the site, and no mines are known to have existed within the proposed project boundaries (CEC RSA, 2010). Many inactive mines and mineral prospects are hosted by metamorphic and intrusive basement rocks within 10 miles of the proposed project boundary, primarily in the Palen and Chuckwalla Mountains. These have produced a number of precious and base metals, including iron (magnetite) and pyrophyllite. Minor gold, silver, copper and uranium prospects are located in the Palen Mountains northeast of the project site. The Black Jack Mine in the northern McCoy Mountains about 16 miles northeast of the site is known as the most productive and most extensively worked manganese mine in the southern California. This manganese mine was active during war times and in the 1950s to produce several thousand tons of manganese. This area is within the Ironwood Manganese District of approximately 1.4-square-mile surface area. Other mining areas, including the Blue Bird Mine area, St. John Mine area, and George Mine area also are located in the northern McCoy Mountains and have produced manganese, copper, and a small amount of silver and gold in the past. Uranium has been claimed in the southern McCoy Mountains about 22 miles east of the project site with reported past production by Caproci-Woock Groups. There are several other prospective or claim areas for minerals in the McCoy Mountains including manganese, copper, silver, gold, and uranium. The Roosevelt and Rainbow group of mines in the Mule Mountain district, also known as the Hodges Mountain district that is located about 26 miles southeast of the project site, have produced some gold and copper from the quartz veins in granitic rocks.

The nearest oil and gas fields are located more than 150 miles west of PSPP site in the Los Angeles Sedimentary basin. The nearest geothermal field is located at Brawley just south of the Salton Sea in the Imperial Valley basin about 40 miles southwest of project site (CEC RSA, 2010).

Several gravel borrow pits are present along Interstate 10 (I-10) south of the proposed site, and the presence of alluvial fan materials at the proposed project location means that the property could be accessed and developed as a source of salable sand and gravel resources. During construction, Solar Millennium may need or desire to move sand and gravel either off-site, or between the different units of the facility. Should this occur, Solar Millennium would be required to comply with the regulations in 43 CFR Part 3600, which regulate the production and use of sand and gravel from public lands. Use of sand and gravel or other mineral materials within the boundaries of an authorized right-of-way is permitted; however, removal of these materials from an authorized right-of-way would require payment to the United States of the fair market value of those materials.

Locatable Minerals

There are no active mining claims within the project area nor is there any locatable mineral activity within the boundaries of the project area. Based on the geological environment and historical trends, the potential for occurrence of locatable minerals is low within the project area.

Leasable Minerals

There are no mineral leases within the project area.

The BLM's Prospectively Valuable maps for leasable minerals show that there is low potential for the occurrence of oil and gas, oil shale or tar sands, coal, sodium, potassium and phosphate. However, the area is identified as prospectively valuable for geothermal resources.

Saleable Minerals/Mineral Materials

Sand and gravel deposits are ubiquitous throughout the project area and the region. There is potential for the project to use mineral materials on or near the site for its own construction needs after proper permitting for use of the material.

3.9 Multiple Use Classes

Under FLPMA Section 601, the BLM has developed the CDCA Plan to “provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality.” In this context, the term “multiple use” means the management of the public lands and resource values so that, among other things, they are used in “a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values” (FLPMA, 2001 Section 103).

The CDCA Plan includes a classification system that places BLM-administered public lands within the planning area into one of four multiple-use classes, based on the sensitivity of the resources and types of uses for each geographic area. The class designations govern the type and degree of land-use actions allowed within the areas defined by class boundaries. CDCA lands in Eastern Riverside County are assigned to the classes in the proportions shown in Table 3.9-1.

TABLE 3.9-1
MULTIPLE-USE CLASS DESIGNATIONS

Class	Acreage	% of Total Planning Area Public Lands
C	576,858	38
L	550,087	36
M	399,024	26
I	0	0
U	1,886	0
Total	***1,527,855***	***100***

Descriptions of the multiple-use classes are:

Class C: Multiple-use Class C (Controlled) has two purposes. First, it shows those areas which are being “preliminarily recommended” as suitable for wilderness designation by Congress. This process is explained in the Wilderness Element of the CDCA Plan (BLM, 1980). Second, it will be used in the future to show those areas formally designated as “wilderness” by Congress.

The Class C Guidelines are different from the guidelines for other classes. They summarize the kinds of management likely to be used in these areas when and if the areas are formally designated wilderness by Congress. These guidelines will be considered in the public process of preparing the final Wilderness Study Reports. However, the final management decisions depend on Congressional direction in the legislation that makes the formal designation.

Class L: Multiple-use Class L (Limited Use) protects sensitive natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.

Class M: Multiple-use Class M (Moderate Use) is based upon a controlled balance between higher-intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources which permitted uses may cause.

Class I: Multiple-Use Class I is an “Intensive use” class. Its purpose is to provide for concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of impacted areas will occur insofar as possible.

Unclassified Lands: Scattered and isolated parcels of public land in the CDCA that have not been placed within multiple-use classes are “unclassified” land. These parcels will be managed on a case-by-case basis, as explained in the Land Tenure Adjustment Element of the CDCA Plan.

Plan Elements: The CDCA Plan Elements provide specific application of the multiple-use class guidelines for specific resources or activities about which the public has expressed significant concern.

The project is on lands designated as MUC-M. The multiple-use class guidelines (BLM, 1980 Table 1) describe land use and resource-management guidance guidelines for 19 land uses and resources as they apply to each class. For MUC-M lands, applicable guidelines from the CDCA Plan, Table 1 are as included in Table 3.9-2.

TABLE 3.9-2
MULTIPLE-USE CLASS-M LAND USE AND RESOURCE MANAGEMENT GUIDELINES

Land Uses / Resources	MUC-M Guidelines
1. Agriculture	Agricultural uses (excluding livestock grazing) are not allowed.
2. Air Quality	These areas will be managed to protect their air quality and visibility in accordance with Class II objectives of Part C of the Clean Air Act Amendments unless otherwise designated another class by the State of California as a result of recommendations developed by any BLM air-quality management plan.
3. Water Quality	Areas designated in this class will be managed to minimize degradation of water resources. Best management practices, developed by the Bureau during the planning process outlined in the Clean Water Act, Section 208, and subsequently, will be used to keep impacts on water quality minimal and to comply with Executive Order 12088.
4. Cultural and Paleontological Resources	Archaeological and paleontological values will be preserved and protected. Procedures described in 36 CFR 800 will be observed where applicable. A Memorandum of Agreement has been signed by the BLM, the California State Historic Preservation Officer, and for cultural resources the President's Advisory Council on Historic Preservation to protect cultural resources.
5. Native American Values	Native American cultural and religious values will be preserved where relevant and protected where applicable. Native American group(s) shall be consulted. Memorandums of Agreement and Understandings have been signed between BLM and the Native American Heritage Commission pertaining to Native American concerns and cultural resources.
6. Electrical Generation Facilities	All types of electrical generation plants may be allowed in accordance with State, Federal, and local laws. Existing facilities may be maintained and upgraded or improved in accordance with special-use permits or by amendments to rights-of-way. • Nuclear and Fossil Fuel may be allowed in accordance with Federal, State and local laws. • Wind/Solar may be allowed after NEPA requirements are met. • Geothermal may be allowed pursuant to licenses issued under 43 CFR Section 3250 et seq. NEPA requirements will be met.
7. Transmission Facilities	New gas, electric, and water transmission facilities and cables for interstate communication may be allowed only within designated corridors (see Energy Production and Utility Corridors Element). NEPA requirements will be met. Existing facilities within designated corridors may be maintained and upgraded or improved in accordance with existing rights-of way grants or by amendments to right-of-way grants. Existing facilities outside designated corridors may only be maintained but not upgraded or improved.
8. Communication Sites	New sites may be allowed. NEPA requirements will be met. A 30-day public comment period is required for environmental assessments for long distance line-of-site communication systems of three or more sites. Existing facilities may be maintained and utilized in accordance with right-or-way grants and applicable regulations.
9. Fire Management	Fire suppression measures will be taken in accordance with specific fire management plans subject to such conditions as the authorized officer deems necessary, such as use of motorized vehicle, aircraft, and fire retardant chemicals.
10. Vegetation	Removal of vegetation, commercial or non-commercial, may be allowed by permit only after NEPA requirements are met and after development of necessary stipulation. Harvesting by mechanical means may be allowed by permit only. All state and federally listed species will be fully protected. Actions which may jeopardize the continued existence of federally listed species will require consultation with the U.S. Fish and Wildlife Service. Identified sensitive species will be given protection in management decisions consistent with BLM policies.

TABLE 3.9-2 (Continued)
MULTIPLE-USE CLASS-M LAND USE AND RESOURCE MANAGEMENT GUIDELINES

Land Uses / Resources	MUC-M Guidelines
10. Vegetation (cont.)	Identified UPAs will be considered when conducting all site-specific environmental impact analyzes to minimize impact. See also Wetland/Riparian Areas guidelines. Mechanical control may be allowed, but only after consideration of possible impacts. Aerial broadcasting application of chemical controls will not be allowed. Spot application will be allowed after site-specific planning. Types and uses of pesticides, in particular herbicides, must conform to Federal, State, and local regulations (see Vegetation Element). Exclosures may be allowed. Prescribe burning may be allowed after development of a site-specific management plan.
11. Land-Tenure Adjustment	Sale of public land may be allowed in accordance with FLPMA and other applicable Federal laws and regulations. Sales in WSAs will not be allowed until after Congressional action.
12. Livestock Grazing	Grazing will be allowed subject to the protection of sensitive resources. Support facilities such as corrals, loading chutes, water developments, and other facilities, permanent or temporary, will be allowed. Manipulation of vegetation by chemical or mechanical means may be allowed and may be designed, developed, and managed for intensive livestock use.
13. Mineral Exploration and Development	Except as provided in Appendix 5.4, 516, DM 6, NEPA procedures titled “Categorical Exclusions”, prior to approving any lease, notice, or application that was filed pursuant to 43 CFR 3045, 3100, 3200, 3500 and S.O. 3087, as amended, an EA will be prepared on the proposed action. Mitigation and reclamation measures will be required to protect and rehabilitate sensitive scenic, ecological, wildlife vegetative and cultural values. Location of mining claims is nondiscretionary. Operations on mining claims are subject to the 43 CFR 3809 Regulations and applicable State and local law. NEPA requirements will be met. BLM will review plans of operations for potential impacts on sensitive resources identified on lands in this class. Mitigation, subject to technical and economic feasibility, will be required. Except as provided in Appendix 5.4, 516 DM 6, NEPA Procedures titled “Categorical Exclusions”, new material sales locations, including sand and gravel sites, will require an EA. Continued use of existing areas of sand and gravel extractions is allowed subject to BLM permits as specified in 43 CFR 3600.
14. Motorized-Vehicle Access/Transportation	Motorized-vehicle use will be allowed on “existing” routes of travel unless closed or limited by the authorized officer. New routes may be allowed upon approval of the authorized officer. Vehicle use on some major significant dunes and dry lakebeds may be is allowed (see Motorized Vehicle Access Element). Periodic or seasonal closures or limitations of routes of travel may be required. Access will be provided for mineral exploration and development. Railroads and trams may be allowed. Airports and landing strips may be allowed by lease subject to conformance with county or regional airport loans and FAA and DOD approval.
15. Recreation	This class is suitable for a wide range of recreation activities which may involve moderate to high user densities. Recreational opportunities include those permitted in Class L. Competitive motorized vehicle events are limited to “existing” routes of travel and must be approved by the authorized officer. Pit, start, and finish areas must be designated by the authorized officer. All competitive events and organized events having 50 or more vehicles require permits. Permanent or temporary facilities for resource protection and public health and safety are allowed. Trails are open for non-vehicle use and new trails for non-motorized access may be allowed.

TABLE 3.9-2 (Continued)
MULTIPLE-USE CLASS-M LAND USE AND RESOURCE MANAGEMENT GUIDELINES

Land Uses / Resources	MUC-M Guidelines
16. Waste Disposal	Public lands managed by BLM may not be used for hazardous or non-hazardous waste disposal. Where locations suitable for such disposal are found on BLM managed lands, consideration will be given to transfer of such sites to other ownership for this use. This amendment applies to waste normally handled through landfills or other waste management facilities. It does not apply to mining waste, including tailings and/or chemicals used in processing ore.
17. Wildlife Species and Habitat	All State and federal listed species and their critical habitat will be fully protected. Actions which may affect or jeopardize the continued existence of federally listed species will require formal consultation with the U.S. Fish and Wildlife Service in accordance with Section 7 of the Endangered Species Act. Identified species will be given protection in management decisions consistent with BLM policies. Control of depredation wildlife and pests will be allowed in accordance with existing State and Federal laws. Same as Classes C and L, except that chemical and mechanical vegetation manipulation may be allowed. Reintroduction or introduction of native species or established exotic species is allowed.
18. Wetland-Riparian Areas	Wetland/riparian areas will be considered in all proposed land-use actions. Steps will be taken to provide that these unique characteristics and ecological requirements are managed in accordance with Executive Order 11990, Protection of Wetlands (42 CFR 26951), legislative and Secretarial direction, and BLM Manual 6740, “Wetland Riparian Area Protection and Management” (10/1/79), as outlined in the Vegetation Element.
19. Wild Horses and Burros	Populations of wild and free-roaming horses and burros will be maintained in healthy, stable herds, in accordance with the Wild and Free-Roaming Horse and Burro Act of 1971 but will be subject to controls to protect sensitive resources. (See Wild Horse and Burro Element.)

3.10 Noise

The project site is located in the Colorado Desert in the eastern part of Riverside County, approximately 0.5 mile north of Interstate 10 (I-10) at the Corn Springs Road intersection. The site is in a remote area of primarily undeveloped land, with open space and some land developed as a nursery. The small community of Desert Center is located approximately 10 miles west of the site, along I-10.The predominant noise source in proximity to the project site is vehicular traffic on I-10.

Sensitive noise receptors are places that are sensitive to excessive noise levels, such as residential areas where noise can interfere with sleep, concentration, and communication, and can cause physiological and psychological stress and hearing loss. In addition, wildlife management areas where breeding could be disturbed are considered sensitive receptors to noise. One residence is located approximately 25 feet from the northwest corner of the proposed right-of-way boundary, but over one mile from the nearest proposed power block. The power block would be the major source of the power plant's noise during the facility's operation. Another residence is located approximately 3,500 feet northwest of the project site boundary and well over a mile from the nearest power block (CEC RSA, 2010).

The bighorn sheep Wildlife Habitat Management Area (WHMA), approximately 2.5 miles northeast of the site, is a sensitive noise receptor due to the presence of breeding Nelson's bighorn sheep. Sensitive bird nesting habitat also occurs in adjacent creosote scrub and desert dry wash woodland.

3.10.1 Ambient Noise

The Applicant conducted a baseline survey to establish an ambient noise level. Ambient noise levels were measured near the western boundary of the site, near the two residences on May 18 to May 19, 2009. One long-term measurement was taken at the two nearest residences over a 25-hour period between 6:51 p.m., May 18, and 7:51 p.m., May 19, 2009 (see Table 3.10-1). The survey was performed using standard acoustical measurement techniques. Figure 4.9-1 (see Section 4.9, *Impacts on Noise*) depicts the noise measurement sites and the nearest residence locations.

TABLE 3.10-1
SUMMARY OF MEASURED NOISE LEVELS

	Measured Noise Levels, dBA	
Measurement Sites	**Average During Daytime Hours L_{eq}**	**Average During Nighttime Hours L_{eq}**
LT1, Nearest Residence	43[a]	34[b]
LT2, Second Nearest Residence	43[a]	34[b]

[a] Staff calculations of average of the daytime hours.
[b] Staff calculations of average of the nighttime hours

SOURCE: CEC RSA, 2010 (Table 2)

The construction and operation of any power plant creates noise or unwanted sound. The character and loudness of this noise, the times of day or night that it is produced, and the proximity of the facility to sensitive receptors all combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts. In some cases, vibration may be produced as a result of power plant construction practices such as blasting or pile driving. The ground-borne energy of vibration has the potential to cause structural damage and annoyance. Definitions of some technical terms related to noise are provided in Table 3.10-2.

TABLE 3.10-2
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).
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_{90}	The A-weighted noise level that is exceeded 90 percent of the time 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).
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: CEC RSA, 2010 (Table A1)

BLM does not establish noise thresholds for public lands, but defers to other Federal, State and local regulatory agencies. Chapter 9.52, Noise Regulation, of the Riverside County Code sets forth noise restrictions to protect the health, safety, and general welfare of residents of Riverside County. This ordinance restricts construction hours within one-quarter mile of an inhabited dwelling to between the hours of six a.m. and six p.m. during the months of June through September and to between the hours of seven a.m. and six p.m. during the months of October through May.

Table 3.10-3 presents restrictions on exterior and interior noise from stationary sources for residential land use zones as identified in the Riverside County General Plan. These restrictions do not apply to construction noise.

TABLE 3.10-3
RIVERSIDE COUNTY LAND USE NOISE STANDARDS FOR STATIONARY SOURCES

Land Use	Time Period	Interior Standards (L_{eq})[a]	Exterior Standards (L_{eq})[a]
Residential	10 p.m. to 7 a.m. 7 a.m. to 10 p.m.	40 55	45 65

[a] Standard is for a 10-minute average.

SOURCE: County of Riverside, 2008

3.11 Paleontological Resources

The project site is located entirely on undisturbed, BLM-administered federal land. The Paleontological Resources Preservation Act of 2009 requires the BLM to manage and protect paleontological resources on Federal land using scientific principles and expertise. The term ‘paleontological resource’ means any fossilized remains, traces, or imprints of organisms, reserved in or on the earth’s crust, that are of paleontological interest and that provide information about the history of life on earth, except that the term does not include--(A) any materials associated with an archaeological resource (as defined in section 3(1) of the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470bb(1)); or (B) any cultural item (as defined in section 2 of the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001). The potential for discovery of significant paleontological resources or the impact of surface disturbing activities to such resources is assessed using the Potential Fossil Yield Classification (PYFC) system. This system includes three conditions: Condition 1 (areas known to contain vertebrate fossils); Condition 2 (areas with exposures of geological units or settings that have high potential to contain vertebrate fossils); and Condition 3 (areas that are very unlikely to produce vertebrate fossils). The PYFC class ranges from Class 5 (very high) for Condition 1 to Class 1 (very low) for Condition 3 (CEC RSA, 2010).

Depending on the published report the project site is located in either the southeastern portion of the Mojave Desert geomorphic province (CEC RSA, 2010), or the northeastern quarter of the Colorado Desert geomorphic province (CEC RSA, 2010), in the Mojave Desert of Southern California near the Arizona border. Geologically and geographically the area is more characteristic of the Mojave Desert geomorphic province. The Mojave Desert is a broad interior region of isolated mountain ranges which separate vast expanses of desert plains and interior drainage basins. The physiographic province is wedge-shaped and separated from the Sierra Nevada and Basin and Range geomorphic provinces by the northeast-striking Garlock Fault on the northwest side. The northwest-striking San Andreas Fault defines the southwestern boundary, beyond which lie the Transverse Ranges. The Colorado Desert geomorphic province lies to the south and east of the proposed project area. The topography and structural fabric in the Mojave Desert is predominately southeast to northwest, and is associated with mid-Miocene to recent faulting oriented similar to the San Andreas Fault. A secondary east to west orientation correlates with structural trends in the Transverse Ranges geomorphic province.

The project site would be situated on a broad alluvial plain within the northwest-trending Chuckwalla Valley between the Chuckwalla Mountains to the southwest, and the Palen Mountains to the northeast. Overall the proposed site slopes at very shallow grades north and northeast toward the local topographic low at Palen Dry Lake.

Quaternary age alluvial, lacustrine and eolian sedimentary deposits are mapped in the vicinity of the project site (CEC RSA, 2010). The local stratigraphy as interpreted by different authors is presented in Table 3.11-1.

TABLE 3.11-1
CORRELATION AND AGES OF STRATIGRAPHIC UNITS

Age	Unit/Description	Jennings (CDMG 1967)	Stone & Pelka (USGS 1989)	Stone (USGS 1990)
Holocene	Eolian sands	Qs	Qs	Qs
	Younger alluvium	Qal	Qya	Qta
	Playa lake deposits	Ql	Qp	Qp
Pleistocene	Older alluvium	Qc	Qia	Qta
			Qoa	

Holocene units, which include eolian sands, younger alluvium, and playa lake deposits, are mapped over nearly the entire project site surface. Eolian sands consist of unconsolidated deposits of well-sorted, wind-blown sand in dunes and sheets. Younger alluvium is composed of sand, pebbly sand and sandy pebble-gravel, and generally is coarser grained closer to mountain ranges. Desert varnish is not well developed in the mostly unconsolidated and undissected sediments. Playa lake deposits are also unconsolidated and are comprised of clay, silt and sand. Older alluvium is present at the surface along the southwestern edge of the project site.

The exposures of older alluvium occur as northeast-oriented ridges of material protruding into the site from the southwest, with the intervening areas occupied by drainages filled with younger alluvium. Older alluvium is composed of consolidated gravel and sand that is moderately dissected with moderately developed desert pavement and varnish.

Exploration drilling conducted in 1978 by the U.S. Geological Survey (USGS) resulted in two boreholes in the Palen Dry Lake area, one of which lies within the boundaries of the proposed plant site. USGS Borehole PDL#1 was advanced to a depth of 505 feet below ground surface (bgs) near the north-central boundary of Section 27 near the northeast corner of the proposed project right-of-way. The lithologic log of PDL#1 indicates the subsurface near the northern site boundary is composed of moderately to thickly bedded sands, gravels, and clays to a depth of approximately 55 feet where a transition to overall clay dominated formation takes place and continues to the total depth of the borehole. The interbedded clays, sands, and gravels probably represent periods of primarily lakebed deposition interspersed with episodes of coarse sediment transport from the nearby Chuckwalla and Palen Mountains. A gravel dominated bed present from approximately 90 to 110 feet also attests to a period of clastic deposition during a period of primarily lakebed sedimentation (CEC RSA, 2010). A water exploration well, 06S/17E-03M01S, which was drilled in 1958 in what is now the southeast portion of the project site reportedly had a similar stratigraphic column with 48 feet of coarse alluvium overlying strata which are clay dominated to a depth of 818 feet bgs (CEC RSA, 2010).

A preliminary geotechnical investigation including 13 exploratory borings and eight test pits was completed for the general area of the project site (CEC RSA, 2010). This investigation reveals that the site is underlain by alluvial and eolian deposits of Pleistocene through Holocene age, which consist of dune sands, alluvium and lake deposits to the depths explored (approximately 76.5 feet below the existing ground surface). The project site is generally surfaced with unconsolidated soils due to desiccation and/or wind deposition to a maximum depth of 2 feet below the existing grade.

Near-surface geology beneath the project site consists primarily of Quaternary alluvium, eolian and lacustrine sediments which increases in age with depth from Holocene at the surface to Pleistocene and older at depth (CEC RSA, 2010). Coarse-grained sediments grade laterally and are interbedded with lakebed deposits of similar ages. Pleistocene age older alluvium, which is exposed along the southwestern boundary of the site, underlies younger alluvium and lacustrine sediments. Older alluvium would likely be buried at progressively deeper depths beneath Holocene sediments to the northeast across the site.

A paleontological resources assessment (CEC RSA, 2010) was prepared. Correspondence from Natural History Museum of Los Angeles County; University of California Berkeley Museum of Paleontology; and the Riverside County Land Information System also was reviewed for information regarding known fossil localities and stratigraphic unit sensitivity within the proposed project area (CEC RSA, 2010). All research was conducted in accordance with accepted assessment protocol of the Society for Vertebrate Paleontology to determine whether any known paleontological resources exist in the general area (CEC RSA, 2010).

The information reviewed indicates there are no recorded fossil collection sites within the proposed project boundary or within a one-mile radius. Three vertebrate fossil collection areas have been documented in the vicinity of the proposed project area within the same or similar sedimentary units which underlie the site. One location east-southeast of the site between I-10 and Ford Dry Lake contained fossil remains of a pocket mouse. Another site northwest of the proposed project site in the northern Chuckwalla Valley yielded fossil remains of tortoise, horse, camel, and llama.

The results of a site-specific comprehensive field survey recorded one non-significant fossil occurrence that yielded a non-diagnostic vertebrate material within the project limits (CEC RSA, 2010). The specimen was discovered *ex-situ* (i.e., removed from its original place of fossilization) as a lag deposit transported an unknown distance and re-deposited on top of alluvial sediments (CEC RSA, 2010). As a result, the fossil resource discovered on the surface within the limits of the project boundary is not considered significant.

The Riverside County Transportation and Land Management Agency (TLMA) has produced a paleontological sensitivity map of the County (CEC RSA, 2010). The mapping indicates that areas underlain by playa lake, eolian and younger alluvial deposits within and around the Palen Dry Lake basin have a high paleontological sensitivity rating. Younger alluvium upslope from the lake bed has a low sensitivity rating, and older alluvium is assigned an undetermined sensitivity rating, according to the TLMA.

The paleontological resource sensitivity of undisturbed Quaternary alluvium and lacustrine sediments varies from low at shallow depths to high at deeper depths. These units are mapped at the surface or may be present near the surface adjacent to these mapped areas along the northern and southern borders of the project site. The depth to Pleistocene age alluvial and lacustrine deposits is undetermined at present for the remainder of the site.

Based on the above research, criteria of the Society for Vertebrate Paleontology, the paleontological report provided in Appendix F, and the confidential paleontological information filing (CEC RSA, 2010), there is a high probability that paleontological resources will be encountered during grading and excavation in the older Quaternary age alluvial and lacustrine sediments within the project site. Further, deeper excavations in the younger alluvium that will encounter the underlying older Quaternary age alluvial soils will also have a high probability to encounter paleontological resources.

3.12 Public Health and Safety

3.12.1 Introduction

The affected environment for Public Health and Safety includes an evaluation of several program areas, including hazardous materials/hazardous waste management, unexploded ordnance (UXO), abandoned mined lands (AML), undocumented immigrants (UDI), transmission line safety and nuisance, traffic and transportation (including aviation) safety, worker safety and fire protection, public and private air strips/airfields, and geologic hazards.

3.12.2 Hazardous Materials

Several factors associated with the project location affect the potential for an accidental release of a hazardous material that could cause public health impacts. These include:

1. local meteorology;
2. terrain characteristics;
3. location of population centers and sensitive receptors relative to the project;
4. existing public health concerns; and
5. existing environmental site contamination.

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 exposure to associated health risks. When wind speeds are low and the atmosphere stable, dispersion is reduced but could lead to increased localized public exposure. Recorded wind speeds and ambient air temperatures are described in Section 3.2, *Air Quality*.

Terrain Characteristics

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume resulting from an accidental release could impact high elevations before impacting lower elevations. The existing topographic conditions of the proposed solar field site show an average slope of approximately one foot in 75 feet (1.33 percent) toward the northeast.

Location of Exposed Populations and Sensitive Receptors

The general population includes many sensitive subgroups that could be at risk from exposure to emitted pollutants. Sensitive receptors are people who are particularly susceptible to illness, such as the elderly, very young children, people already weakened by illness (e.g., asthmatics), and persons engaged in strenuous exercise, or locations or institutions that may be occupied predominantly by one or more of these sensitive subgroups, such as residences, schools, hospitals, and hospices. The location of the population in the area surrounding a project site may have a major bearing on health risk. The nearest sensitive receptors are single residences about 25 feet and 3,500 feet from the project's northwest boundary, but over one mile from the nearest power block; otherwise, there are no sensitive receptors within a three-mile radius of the project site. Within a six-mile radius of the site, the total population is 17 people. The nearest school (Eagle Mountain Elementary School) is about 10 miles west of the site.

Existing Public Health Concerns

Analyses of existing public health issues typically are prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near proposed project sites to provide a basis on which to evaluate any additional health impacts from the proposed action. Because of the very low population in the immediate vicinity of the project and because no existing health concerns within a six-mile radius of the site have been identified by the Applicant (CEC RSA, 2010), no analysis of existing public health issues has been conducted.

Existing Environmental Site Contamination

The Phase I Environmental Site Assessment conducted for the project site in 2009 found no "Recognized Environmental Conditions" per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site, nor was there any other environmental concern that would require remedial action (CEC RSA, 2010).

3.12.3 Waste Management

The Riverside County Waste Management Department operates six landfills, has a contract agreement for waste disposal with an additional private landfill, and administers several transfer station leases (see Table 3.12-1, *Solid Waste Disposal Facilities*, for the capacities of landfills that are available to receive solid waste generated in Riverside County). The California Integrated Waste Management Act requires that each jurisdiction reuse, recycle, compost, or otherwise divert 50 percent of its annual waste away from landfills or show a good faith effort to reach this goal. The unincorporated areas of Riverside County currently meet their diversion goal, in addition to adopting the necessary plans and policies to comply with the act (CalRecycle, 2010). The combined remaining capacity of these eight landfills which may receive project waste (this excludes the Oasis Sanitary and Desert Center Landfills) is over 200 million cubic yards; however, the remaining capacity of the Oasis Sanitary Landfill is only 75,727 cubic yards, and the remaining capacity of the Desert Center Landfill, which is expected to close in 2011, is only 23,246 cubic yards (CEC RSA, 2010).

TABLE 3.12-1
SOLID WASTE DISPOSAL FACILITIES

Waste Disposal Site	Title 23 Class	Maximum Permitted Capacity (Cubic Yards)	Current Operating Capacity (Tons/Day)	Remaining Capacity (Cubic Yards)	Estimated Closure Date
Badlands Sanitary Landfill	Class III	30,386,332	4,000	21,866,092	2016
Lamb Canyon Sanitary Landfill	Class III	34,292,000	3,000	20,908,171	2023
Oasis Sanitary Landfill	Class III	870,000	400	75,727	2019
Desert Center Landfill	Class III	117,032	60	23,246	2011
Blythe Sanitary Landfill	Class III	4,633,000	400	2,289,139	2034
El Sobrante Landfill	Class III	184,930,000	10,000	118,573,540	2030
Monofill Facility	Class II	1,729,800	750	1,314,800	2012
Chiquita Canyon Sanitary Landfill	Class II, III	63,900,000	6,000	35,800,000	2019
Kettleman Hills Landfill	Class I	10,700,000	8,000	1,100,000	2037
Clean Harbors Buttonwillow Landfill	Class I	14,300,000	10,500	8,884,000	2043

Class I landfill – A landfill that accepts for disposal 20 tons or more of municipal solid waste daily (based on an annual average) including permitted hazardous wastes.

Class II landfill – A landfill that (1) accepts less than 20 tons daily of municipal solid waste (based on an annual average); (2) is located on a site where there is no evidence of groundwater pollution caused or contributed by the landfill; (3) is not connected by road to a Class I municipal solid waste landfill, or, if connected by road, is located more than 50 miles from a Class I municipal solid waste landfill; and (4) serves a community that experiences (for at least 3 months each year) an interruption in access to surface transportation, preventing access to a Class I landfill, or a community with no practicable waste management alternative.

Class III landfill – A landfill that is not connected by road to a Class I landfill or a landfill that is located at least 50 miles from a Class I landfill. Class III landfills can accept no more than an average of 1 ton daily of ash from incinerated municipal solid waste or less than 5 tons daily of municipal solid waste.

SOURCE: CalRecycle, 2010

3.12.4 Unexploded Ordnance (UXO)

Unexploded ordnance (UXO) are military munitions that have been primed, fused, armed or otherwise prepared for action, fired, dropped, launched, projected, or placed in such a manner to constitute a hazard to operations, installations, personnel, or material; or remain unexploded either by malfunction, design, or any other case (USAEC, 2010). UXO presents an immediate risk of acute physical injury from fire or explosion resulting from accidental detonation.

Although the Phase I ESA did not mention the potential of encountering unexploded ordnance (UXO) at or near the project site, historical use of the project site included General George Patton’s Desert Training Camps during World War II. Palen Pass is near the project site and was the site of some of the largest mock battles in the California-Arizona Maneuver Area. Live-fire training occurred in camps and facilities in the PSPP area. Additionally, conventional and unconventional land mines and improvised personnel mines have been detected along with UXO. Due to historical uses in and adjacent to the PSPP area, UXO are a potential hazard at the project site.

3.12.5 Undocumented Immigrants (UDI)

There are no known incidents with undocumented immigrants at the site or near the project area.

3.12.6 Transmission Line Safety and Nuisance

This affected environment analysis focuses on hazards and nuisances resulting from the presence of transmission lines, taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields.

Power generated from the project would be transmitted to the Southern California Edison (SCE) power grid using a single-circuit overhead 230 kV line. The point of connection with the SCE grid would be at SCE's proposed Red Bluff Substation, approximately five miles to the west. Since SCE's Red Bluff Substation would be under the jurisdiction of the CPUC, it would be designed, built, and operated to reflect implementation of CPUC requirements.

The site is in an undeveloped open desert land with no existing structures other than SCE's 161-kV Eagle Mountain-Blythe transmission line that traverses the southwestern portion of the site. The proposed transmission line would exit the northwest corner of the project site and travel west and south, crossing the I-10, and would continue south to the proposed Red Bluff Substation. The available land for the line's right-of-way would traverse some BLM-administered land in a largely uninhabited desert area, which has only two residences within two miles of the transmission line route, one of which would be as close as 1,000 feet from the line. The closest residence to the project site is approximately 25 feet northwest of the southern site boundary and the next closest is 3,500 feet northwest of the southern site boundary (CEC RSA, 2010).

Aviation Safety

Hazards to area aircraft can arise from the potential for collision in the navigable airspace. However, the project site is not located near a major commercial aviation center.

The closest airfield to the project site is the privately-operated Desert Center Airport, which is located at the end of an unnamed road, one mile (1.6 km) east of CA Route 177 (Desert Center – Rice Road) and 5 miles (8.0 km) northeast of the town of Desert Center; this is approximately 5 miles northwest of the main project site but only 2 miles from the proposed gen-tie line. The Desert Center Airport was built in the early 1940s as Desert Center Army Airfield, officially opened in April 1943, and turned over to the Army Corps of Engineers in 1946, following the end of World War II. The airport operated as a civil airport (owned by Riverside County) at some point between 1966 and 2002; however, by 2002 it was all but abandoned. In 2003, the airfield was being used to fly unmanned aircraft: the hangar had been converted to a workshop and an inclined launching ramp was constructed. Thereafter, Riverside County sold the airfield to Chuckwalla Valley Associates, LLC, which now operates two runways to service the Chuckwalla Valley Raceway (FAA, 2010a; AirNav, 2010). The most recent information available indicates 150 aircraft operations per year at the airfield for the 12-month period ending December 31, 2006 (AirNav, 2010).

The next closest airport (Blythe Airport) is located about 30 miles east of the project site, outside the path of the proposed transmission lines.

Communication System Interference

According to the Federal Aviation Administration, communication systems interference can be caused by solar technologies that cause a negative impact on radar, NAVAIDS, and infrared instruments (FAA, 2010b). Radar interference occurs when objects are placed too close to a radar sail (or antenna) and reflect or block the transmission of signals between the radar antenna and the receiver (either a plane or a remote location). NAVAIDS can be impacted similarly to radar, but they include passive systems with no transmitting signals. Impacts on infrared communications can occur because the solar panels continue to retain heat into the first part of dusk and the heat they release can be picked up by infrared communications in aircraft causing an unexpected signal.

Although it is possible for communication system interference to be caused by other communication signals, it is less common. Transmission line related radio frequency interference is produced by the physical interactions of line electric fields and is a potential indirect effect of transmission line operation. 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. Because of the power loss from such corona discharges, it is in the interest of each line proponent to employ design, construction, and maintenance plans that minimize them. When generated, such corona noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication when the signal is amplitude modulated (AM). Such radio interference is the buzzing and crackling noise one might hear from the speaker of an AM broadcast receiver when near a transmission line. The potential for corona-related interference generally becomes a concern for lines with voltage of 345 kV and above, and less so for lines such as the proposed 230 kV transmission line.

Frequency modulated (FM) signals are normally unaffected as are modern digital signals such as those involved in cellular telephone communication or modern airport and other types of radio communication. Maximum interference levels are not specified as design criteria for modern transmission lines because the level of the AM interference in any given case would depend 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. The level of any such AM 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 Federal Communications Commission (FCC) requires the line's owner to mitigate such interference in any specific case.

Audible Noise

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. The noise level depends upon the strength of the line's electric field, and is a concern mainly from lines of 345 kV or higher. In fair weather, audible noise from modern transmission lines generally is indistinguishable from background noise at the edge of a right-of-way 100 or more feet wide. The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulated noise limits. As with radio noise, it is limited through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability.

Fire Hazards

Transmission line-related fire hazards could be caused by sparks from conductors of overhead lines, or from direct contact between the line and nearby trees and other combustible objects.

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. However, 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.

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. The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices specified in the National Electrical Safety Code and the joint guidelines of the American National Standards Institute and the Institute of Electrical and Electronics Engineers (CEC RSA, 2010).

Electric and Magnetic Field Exposure

Electric and magnetic fields (EMF) occur together whenever electricity flows. The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines; however, scientific uncertainty regarding these potential health effects remains. Available data have not established that EMF exposure is a human health hazard. 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 that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

While there is considerable uncertainty about EMF health effects, State policy requires reduction of EMF in the design, construction, and maintenance of new or modified lines, if feasible, without affecting the safety, efficiency, reliability, and maintainability of the transmission grid. Further, each new or modified transmission line in California must be designed according to the EMF-reducing guidelines of the electric utility in the service area involved. EMF produced by new lines must be similar to the fields of comparable lines in that service area.

3.12.7 Traffic and Transportation Safety

Roadway Access

Access to the PSPP would be from an extension of Corn Springs Road at the I-10 interchange. The Corn Springs Road extension would be about 1,350 feet long and would run east from just north of the I-10 Corn Springs Road entrance/exit ramps to the project site entrance. For setting information relative to these roadways, see Section 3.17, *Transportation and Public Access – Off-Highway Vehicle Resources*.

The project also proposes to construct an approximately 7.5 mile transmission line running west and south from the site that would cross I-10 before reaching SCE's new Red Bluff substation.

Airports

No major airports exist near the project site. As described under Aviation Safety, above, the closest airfields to the project site are the Desert Center Airport and the Blythe Airport. The Desert Center Airport is approximately 5 miles northwest of the project site but only 2 miles from the gen-tie line. The Blythe Airport is much farther away: about 30 miles east of the site.

Emergency Services Vehicle Access

Riverside County has adopted the 2007 California Fire Code and 2007 California Building Standards Code in their entirety regulating and governing the safeguard of life and property from fire and explosion hazards arising from the storage, handling and use of hazardous substances, materials, and devices, and from conditions hazardous to life or property in the occupancy of buildings and premises in the Riverside County (Riverside County Ord. No. 787). Accordingly, emergency services access roads must be installed and made serviceable prior to and during the time of construction. The grade of the fire department access road must be within the limits established by the Fire Chief and may not exceed 15 percent. The project would include the development of two all-weather access roads in accordance with County and fire code requirements to provide adequate access for emergency vehicles.

Water and Rail Obstructions

The project would not be located adjacent to a navigable body of water; therefore, the project would not be expected to alter water-related transportation. The nearest passenger rail service is an Amtrak station in Palm Springs to the west. Additionally, commercial rail service is banned in Riverside County.

Reflectivity

Reflectivity refers to light reflected off of surfaces that could cause a brief episode of a loss of vision (also known as flash blindness) on pilots or air traffic controllers. Potential impacts of reflectivity include glint and glare. The term *glint* refers to a momentary flash of bright light; by comparison, *glare* is a continuous source of bright light. Flash blindness is defined in FAA Order 7400.2f as "a temporary visual interference effect that persists after the source of illumination has ceased." For facilities placed in the desert, far from most ground-based receptors, potential impacts would be limited to aircraft passing by (FAA, 2010b).

The amount of light reflected off of a solar panel surface depends on the amount of sunlight hitting the surface as well as the surface reflectivity. The amount of sunlight interacting with the solar panel will vary based on geographic location, time of year, cloud cover, and solar panel orientation. Frequently, 1,000 watts per square meter (W/m2) is used in calculations as an estimate of the solar energy interacting with a panel. According to researchers at Sandia National Lab, flash blindness for a period of 4-12 seconds (i.e., time to recovery of vision) occurs when 7-11 W/m2 (or 650-1,100 lumens/m2) reaches the eye (FAA, 2010b).

Reflectivity from solar projects varies depending on the type of solar technology, its materials and design. Concentrated solar power systems such as the project use mirrors to maximize reflection and focus the reflected sunlight and associated heat on a design point to produce steam that generates electricity. Concentrated solar power systems tend to be highly reflective: the percent of sunlight reflected is about 90 percent, translating to 900 W/m2 reflected (FAA, 2010b).

The character of reflected light, i.e., whether it is "specular" or "diffuse," also is important in evaluating reflectivity. Specular reflection occurs when the surface in question is smooth and polished; it results in a more concentrated type of light. Diffuse reflection occurs from rough surfaces such as pavement or vegetation; it produces a less concentrated light. Flash blindness generally occurs only from specular reflections.

Distance between a solar field and potential reflectivity receptors also factors into an analysis of potential impacts, because the intensity of the light reflected from the solar panel decreases as the distance from it increases. The distance necessary to avoid flash blindness is directly proportional to the size of the array in question (FAA, 2010b).

Accordingly, under certain circumstances, reflected light and glare could affect the vision of pilots flying within view of the proposed solar field.

Industrial Plumes

In January 2006, the FAA conducted a Safety Risk Analysis (SRA) of industrial plumes (FAA, 2006). Based on this analysis, the FAA concluded that turbulence associated with plumes could result in the following:

1. Possible airframe damage or negative effects on aircraft stability in flight or both;

2. Adverse effects on aircraft due to high levels of water vapor, engine and aircraft contaminants, icing, and restricted visibilities; and

3. Loss of the aircraft or fatal injury to the crew as well as substantial damage to ground facilities.

As a result, the FAA recommended that FAA Order 7400.2 be amended to consider a plume-generating facility as a hazard to navigation when expected flight paths pass less than 1,000 feet above the top of the object. In addition, the FAA included in its 2006 Safety Risk Analysis three other recommendations concerning plumes:

1. Amend the Aeronautical Information Manual (AIM), Chapter 7, Section 5, with wording that overflights at less than 1,000 feet vertically above plume-generating industrial sites should be avoided;

2. Where operationally feasible, make permanent the temporary flight restriction (TFR) that pertains to the overflight of power plants; and

3. Amend Advisory Circular 70.7460-2K, *Proposed Construction of Objects that May Affect Navigable Airspace*, by changing Instructions to completing FAA Form 7460-1, *Notice of Proposed Construction or Alternation*, Item #21 by adding "For structures such as power plants or any industrial facility where exhaust plume discharge could reasonably be expected and reportable under the provisions of Part 77, thoroughly explain the nature of the discharge."

According to the FAA, those actions would serve to further enhance aviation safety within the National Airspace System.

More recently, in its 2010 FAA Solar Guide, the FAA explained that thermal plume-related hazards vary depending on the solar technology employed. A "power tower," for example, produces unexpected upward moving air columns into navigable air space that raise concerns about hazards to safe air navigation. By contrast, conventional solar thermal and photovoltaic solar energy systems can be used reliably and safely even on airport property (FAA, 2010b).

3.12.8 Worker Safety and Fire Protection

Worker safety and fire protection is regulated through the implementation of the federal, state, and local laws, ordinances, regulations, and standards (LORS) identified in Table 1-1.

3.12.9 Geologic Hazards

The project site is located entirely on undisturbed BLM-administered federal land in a moderately active geologic area of the eastern Mojave Desert geomorphic province in eastern Riverside County in southeastern California. This discussion presents the existing geologic hazards in the region of the project site. A brief geologic overview is provided and includes information from a preliminary geotechnical investigation completed by Kleinfelder in 2009. The preliminary geotechnical investigation included 13 exploratory borings and eight test pits in the project study area (CEC RSA, 2010).

Regional Geology

The project site is located in the southeastern portion of the Mojave Desert geomorphic province (CEC RSA, 2010). The Mojave Desert is a broad interior region of isolated mountain ranges that separate vast expanses of desert plains and interior drainage basins. The physiographic province is wedge-shaped, and separated from the Sierra Nevada and Basin and Range geomorphic provinces by the northeast-striking Garlock fault on the northwest side. The northwest-striking San Andreas Fault defines the southwestern boundary, beyond which lie the Transverse Ranges and Colorado Desert geomorphic provinces.

Local Geology

The project site would be situated on a broad alluvial plain within the northwest-trending Chuckwalla Valley between the Chuckwalla Mountains to the southwest, and the Palen Mountains to the northeast. Overall the project site slopes at very shallow grades north and northeast toward the local topographic low at Palen Dry Lake. Quaternary age alluvial, lacustrine and eolian sedimentary deposits are mapped in the vicinity of the project site (CEC RSA, 2010).

Topography

The topography in the Mojave Desert is predominately sloping southeast to northwest, and is associated with faulting similarly-oriented to the San Andreas Fault. A secondary east to west orientation correlates with the topography associated with the Transverse Ranges geomorphic province. Overall the project site slopes at very shallow grades north and northeast toward the local topographic low at Palen Dry Lake. The ground surface in the study area generally slopes gently downward to the southeast at a gradient of less than 1%. Ground surface elevations range from approximately 680 feet msl in the southwest to 425 feet msl in the northeast. Steeper grades are present as the terrain transitions to the isolated sand dunes along the northern portion of the site.

Soils

A preliminary geotechnical investigation including 13 exploratory borings and eight test pits reveals that the project site is underlain by alluvial and eolian deposits of Pleistocene through Holocene age, consisting of dune sands, alluvium, and lake deposits to depths of 76.5 feet below the existing ground surface (the maximum depth of exploratory borings). The project site contains loose soils due to desiccation and/or wind deposition to a maximum depth of 2 feet below the existing grade. The materials below the surface soils are generally medium dense to very dense, poorly graded sand with varying amounts of silt, silty sand and clayey sand. Firm to very hard sandy clays are locally present as interbedded layers 5 to 10 feet thick at depths generally greater than 25 feet below existing grade. More detailed information about soils present at the site and impacts to soil resources are discussed in Section 3.15, *Soil Resources*, and Section 4.14, *Impacts to Soil Resources*.

Faulting and Seismicity

The project site is not crossed by any known active faults or designated Alquist-Priolo Earthquake Fault Zone (CEC RSA, 2010). A number of major, active faults lie within 63 miles of the site. The fault type, potential magnitude, and distance from the site are summarized in Table 3.12-2. Each of the faults listed are considered active. Because of the large size of the project site, the distances to faults were measured from the approximate center of the site. The closest mapped active faults to the solar plant site are the faults attributed to the Brawley Seismic Zone located approximately 37 miles to the southwest. Several northwest-striking, inactive faults are mapped at the extreme southern end of the Palen Mountains, and are inferred beneath Quaternary and Tertiary sediments in Chuckwalla Valley (CEC RSA, 2010). These faults are part of a major Mesozoic terrain-bounding structural zone that was active during late Jurassic time, and are associated with folding and metamorphism in the Palen and McCoy Mountains. They are not exposed anywhere on the surface of the project site.

TABLE 3.12-2
ACTIVE FAULTS RELATIVE TO THE PROPOSED PROJECT SITE

Fault Name	Distance from Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)
Brawley Seismic Zone	37.0	6.4	0.071
San Andreas: Coachella M-1c-5	37.0	7.2	0.108
San Andreas SB-Coachella M-1b-2	37.0	7.7	0.140
San Andreas: Whole	37.0	8.0	0.165
Elmore Ranch	40.6	6.6	0.073
Pinto Mountain	50.8	7.2	0.085
Pisgah-Bullion Mountain– Mesquite Lake	54.9	7.3	0.084
Imperial	57.4	7.0	0.069
Superstition Hills	59.0	6.6	0.055
San Jacinto–Anza	60.0	7.2	0.074
Superstition Mtn.	62.1	6.6	0.053

SOURCE: CEC RSA, 2010 Geology and Paleontology Table 3

Seismic Hazards

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude and nature of fault rupture can vary for different faults, or even along different strands of the same fault. Ground rupture is considered most likely along active faults. No active or potentially active faults are mapped within the study area (CEC RSA, 2010). The closest fault zone to the site zoned under the Alquist-Priolo Special Studies Zone Act is the Brawley Seismic Zone, which is 37 miles from the study area.

Ground Shaking

Generally, the greater the earthquake magnitude and the closer the fault rupture to a site, the greater the intensity of ground shaking. The amplitude and frequency of ground shaking is related to the size of an earthquake, the distance from the causative fault, the type of fault (e.g., strike-slip), and the response of the geologic materials at the site. Ground shaking can be described in terms of acceleration, velocity, and displacement of the ground.

A common measure of ground motion during an earthquake is the peak ground acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. Unlike measures of magnitude, which provide a single measure of earthquake energy, PGA varies from place to place, and is dependent on the distance from the epicenter and the character of the underlying geology (e.g. hard bedrock, soft sediments or artificial fills). The estimated bedrock peak horizontal ground acceleration for the power plant is 0.27 times the acceleration of gravity (0.27g) based on 2 percent probability of exceedence in 50 years under 2007 California Building Code criteria (CEC RSA, 2010). Determination of the peak horizontal ground acceleration at the ground surface will require additional analysis once a design-level geotechnical report has been prepared for the project.

The Modified Mercalli Intensity Scale (Table 3.12-3) assigns an intensity value based on the observed effects of ground-shaking produced by an earthquake. Unlike measures of earthquake magnitude, the Modified Mercalli Intensity Scale (MM) is qualitative in nature (i.e., it is based on actual observed effects rather than measured values). MM intensity values for an earthquake at any one place can vary depending on its magnitude, the distance from its epicenter, and the type of geologic material. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), where intensities ranging from IV to X could cause moderate to significant structural damage. Because the MM is a measure of ground-shaking effects, intensity values can be related to a range of PGA values, also shown in Table 3.12-3.

The close proximity of the project site to the Mojave-Sonoran belt and relatively great distance from more seismically active areas to the west and northwest would suggest a relatively low to moderate probability of intense ground shaking in the project area. However, events such as the Landers earthquake (7.6 Mw), which occurred on June 28, 1992 approximately 78 miles from the project site (CEC RSA, 2010), demonstrate that the proposed site could be subject to moderate levels of earthquake-related ground shaking in the future.

Secondary Earthquake Hazards

Secondary earthquake hazards at the site include earthquake-induced land sliding, settlement, and liquefaction. Liquefaction is a condition in which a saturated cohesionless soil may lose shear strength because of a sudden increase in pore water pressure caused by an earthquake. Lateral spreading of the ground surface can occur within liquefiable soil beds during seismic events. Lateral spreading generally requires an abrupt change in slope such as a nearby steep hillside or deeply eroded stream bank. Other factors such as distance from the epicenter, magnitude of the

TABLE 3.12-3
MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Ground Acceleration[a]
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	0.0017-0.014 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	0.0017-0.014 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.014–0.039g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.035 – 0.092 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.092 – 0.18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.18 – 0.34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.34 – 0.65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65 – 1.24 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 1.24 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

NOTES:
[a] Value is expressed as a fraction of the acceleration due to gravity (g). Gravity (g) is 9.8 meters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCE: ABAG, 2003

seismic event, and thickness and depth of liquefiable layers also affect the amount of lateral spreading. The potential for liquefaction of strata deeper than approximately 40 feet below the ground surface is considered negligible because geologic pressures exerted on soils at that depth create soils too compact to liquefy.

Earthquake-induced settlement 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. The decrease in volume can result in settlement of overlying structural improvements. Loose soils identified at the site could potentially settle during a seismic event.

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Slope stability can depend on several complex variables, including the geology, structure, the amount of groundwater present, as well as external processes such as climate, topography, slope geometry, and human activity. The factors that contribute to slope movements include those that decrease the resistance in the slope materials and those that increase the stresses on the slope.

While landslides can occur on slopes of 15 percent or less, the probability is greater on steeper slopes, especially those that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Landslides typically occur within geologic units that contain excessive amounts of water; are located on steep slopes; or where unstable soil already tends to move down-slope. Landslide potential at the project site is low since the proposed energy facility is located on broad, gently sloping terrain.

Other Geologic Hazards

Subsidence and Settlement

Potential hazards in the study area include subsidence, settlement, and earthquake-induced settlement (discussed above). Subsidence of the land surface is a general process that can be attributed to natural phenomena, such as tectonic deformation, consolidation, hydro compaction, collapse of underground cavities, oxidation of organic-rich soils, or rapid sedimentation, and also by the activities of man, such as the withdrawal of groundwater. Local subsidence or settlement may also occur when areas containing compressible soils are subjected to foundation or fill loads.

The Riverside County General Plan indicates the basin fill sediments in Chuckwalla Valley are susceptible to subsidence (CEC RSA, 2010). Regional ground subsidence is typically caused by petroleum or groundwater withdrawal that increases the weight per unit volume 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 dense to very dense granular site soils are indicative of low to negligible local subsidence. Groundwater levels in the area have been steady in recent years and petroleum withdrawals do not occur locally.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) generally is limited to young, saturated soils that were deposited rapidly, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with properties similar to weak cement. These soils can be compressed easily or collapse under pressure as well as dissolve if infiltrated by water. Foundations built on these types of compressible materials can settle excessively. The depositional environment of the Chuckwalla Valley suggests that the soils may be subjected to hydrocompaction. The project geotechnical report indicates that there is a low to moderate hydrocompaction potential based on the geotechnical data and the observation of soil profile in the test pits (CEC RSA, 2010).

Expansive Soils

Expansive soils have high clay content and in response to changes in moisture content can cause movements that result in damage and/or distress to structures and equipment with shallow foundations. Expansion or contraction occurs near the ground surface where changes in moisture affect the soils. The addition of moisture from irrigation, capillary tension, water line breaks, etc. causes 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 correspond to movement of overlying structural improvements. Often times, grading, site preparations, and backfill operations associated with subsurface structures can eliminate the potential for expansion. The near surface soils are primarily granular with no to low swell potential; however, potentially expansive soils were observed at the ground surface in the northeastern portion of the site (CEC RSA, 2010).

Corrosive Soils

Corrosivity refers to potential soil-induced electrochemical or chemical action that could corrode or deteriorate concrete, reinforcing steel in concrete structures, and bare-metal structures exposed to these soils. The rate of corrosion is related to factors such as soil moisture, particle-size distribution, and the chemical composition and electrical conductivity of the soil. Fine grain soils with naturally high moisture contents that contain sulfides can be corrosive to buried metal pipe. Placing pipes in corrosive soils could lead to premature pipe failure and leaking. Such soils are present at the project site, and the preliminary geotechnical investigation (CEC RSA, 2010) indicates that site soils could be potentially corrosive to metal pipe.

Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of wind. Additionally, local flash flooding contributes to erosion. Excessive soil erosion can eventually lead to damage of building foundations and roadways. Areas that are susceptible to erosion are soils that would be exposed during the construction phase. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete, structures, asphalt, or slope protection features. More detailed information about erosion potential of the soils and impacts to soil resources as a result of erosion are discussed in Section 3.15, *Soil Resources*, and Section 4.14, *Impacts to Soil Resources*.

Volcanic Hazards

The project site is located approximately 40 miles west of the Lavic Lake volcanic hazard area (VHA), an approximately 14-square-mile area within the Mojave Desert comprised of Miocene to Holocene age dacitic to basaltic flows, pyroclastic rocks, and volcaniclastic sediments. The Lavic Lake VHA has been designated by the USGS as an area subject to lava flows and tephra deposits associated with basalt or basaltic andesite vents (CEC RSA, 2010). The Lavic Lake VHA is considered to be subject to future formation of cinder cones, volcanic ash falls, and phreatic explosions.

3.12.10 Site Security

The energy generation sector is one of 14 areas of Critical Infrastructure listed by the U.S. Department of Homeland Security (DHS). Nearly all of the other areas of Critical Infrastructure are reliant, at least in part, on the energy sector. The level of security needed for any particular facility depends on the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

On April 9, 2007, the DHS published, in the Federal Register (6 CFR Part 27), an Interim Final Rule setting forth Chemical Facility Anti-Terrorism Standards requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals of interest, on November 2, 2007. Petroleum is listed as a chemical of interest with a threshold level of 60,000 lbs. The project would store a maximum of 152,000 lbs of propane/LPG and, therefore, the CFATS regulation will apply and the Applicant would need to submit a “Top Screen” assessment to the DHS. The chemical constituents of Therminol VP-1 (diphenyl ether and biphenyl) and other chemicals proposed to be used and stored at the project site are not on the chemicals of interest list.

Energy sector members also are leading a significant voluntary effort to increase planning and preparedness, including infrastructure protection and cyber security. The North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC, 2002) as well as issued a Critical Infrastructure Protection standard for cyber security (NERC, 2009), and the U.S. Department of Energy published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE, 2002).

3.13 Recreation

3.13.1 On-site Allowable Recreational Uses

Recreational uses on public lands at the project site are guided by the CDCA Plan (BLM, 1980) and the NECO Plan (BLM CDD, 2002). The site is designated in the CDCA and NECO Plans as Multiple Use Class M (Moderate Use; MUC-M). The Class M category is suitable for a range of recreation activities, which generally involve moderate to high user densities, including backpacking, primitive unimproved site camping, hiking, horseback riding, rockhounding, nature study and observation, photography and painting, rock climbing, spelunking, hunting, land sailing on dry lakes, noncompetitive vehicle touring, and events only on "designated open" routes of travel. (BLM, 1980; BLM CDD, 2002). Recreational opportunities allowed in MUC-M designated areas include those permitted in Class L and C (BLM CDD, 2002). Permanent or temporary facilities for resource protection and public health and safety also are allowed (BLM, 1980). Trails are open for non-vehicular use and new trails for non-motorized access may be allowed. Recreational vehicle use, including off-highway vehicle (OHV) use, is discussed in Section 3.17, *Transportation and Public Access – Off-Highway Vehicle Resources*.

Primary activities observed on the project site by BLM staff include OHV touring and sightseeing, photography, rockhounding, hiking, and hunting. Camping or backpacking is not common. There are no recreation facilities or specific recreational attractions on the site. The BLM has no visitor counts for the site but visitor use is assumed to be low due to the limited availability and accessibility of recreation opportunities in the immediately surrounding area. Most use is by local residents from Desert Center and Blythe, or visitors stopping for short periods while traveling along I-10.

3.13.2 Regional Recreation Areas and Opportunities

The unincorporated community of Desert Center is the closest community to the site. Desert Center is approximately 10 miles west of the site in the Chuckwalla Valley. It has no community parks. The Riverside County Regional Park and Open Space District operates no regional parks or open space areas in the Chuckwalla Valley. Similarly, there are no California State parks within the Chuckwalla Valley. Lake Tamerisk, located two miles north of Desert Center, is a 55 member-owned community for active seniors with 150 mobile homes spaces, mobile home rentals, dry campground, heated pool and club house (Lake Tamarisk Desert Resort, 2010).

By contrast, both the Palo Verde Valley to the east of the site and the Coachella Valley to the west offer myriad outdoor recreational opportunities for boating, water skiing, jet skiing, swimming, fishing, canoeing, camping, rock hounding, hiking, archery, hunting, horseback riding, trapping, trap and skeet shooting, and OHV use. The City of Blythe (within the Palo Verde Valley approximately 38 miles east of the site) and the City of Indio (within the Coachella Valley approximately 60 miles west of the site) provide for year-round sporting activities.

The Blythe Parks Department oversees eight parks (approximately 74 acres total), including five neighborhood parks, two community parks, and one regional park. The “Big Foot Skate-board Park” is located at Todd Park. Other recreational opportunities in Blythe include the Blythe Municipal Golf Course; Blythe Skeet & Trap Club (a shooting range and gun club); Blythe Marina; soccer, football, track and volleyball leagues; and indoor racquetball, basketball, aerobic activities, weight room, and summer swimming. Various nearby privately-owned recreational vehicle (RV) parks and campgrounds also provide recreational facilities, including a boat dock, launch ramp, fishing, swimming, horseshoe pits, wildlife observation and other active and passive recreation opportunities (Blythe, 2007).

The City of Indio’s Buildings and Parks Division oversees 11 parks (Indio, 2010). Other recreational opportunities in Indio include several golf clubs, equestrian centers and private polo fields; two public tennis courts; seven museums, including the Coachella Valley Museum and Cultural Center; seven cultural murals; and the Indio Date Gardens. Various nearby privately-owned RV parks and campgrounds also provide recreational facilities, including a boat dock, launch ramp, fishing, swimming, horseshoe pits, wildlife observation and other active and passive recreation opportunities (Village Profile, 2010).

The BLM administers wilderness areas; campgrounds, including long term visitor areas (LTVAs); trails; interpretive sites; and an extensive network of backcountry approved travel and OHV routes in the vicinity of the site. Areas of critical environmental concern (ACECs) and wilderness also provide dispersed recreation opportunities in the region. Overall, recreation use on BLM lands in the California desert is limited to the cooler months of September through May, with little or no use in the summer. Popular recreation activities include car and RV camping, OHV riding and touring, hiking, photography, hunting (dove, quail, deer), sightseeing and visiting cultural sites. Outside of fee collection sites, the BLM has no accurate estimates of visitor use; however, staff observations and Law Enforcement Ranger patrols indicate the area described in this section received approximately 2,000 – 3,000 visitors per year. Recreation areas within 20 miles of the project site are identified in Table 3.13-1, beginning with the area closest to the site, and are discussed below.

The National Park Service administers the Joshua Tree National Park the southeast end of which is located about three miles west of the project site. Joshua Tree National Park comprises approximately 1,017,748 acres, mostly federally-administered, and is used for hiking, mountain biking and rock climbing, and includes nine campgrounds. Other recreational opportunities within the Park include wildflower viewing and birdwatching (NPS, 2011; NPS, 2010). The Park is open year round, with peak visitation occurring in April. There were 1,280,917 recreational visits to the Park in 2001 (National Parks Conservation Association, 2002).

Wilderness Areas

Wilderness Areas are shown in Figure 3.16-1 and described in Section 3.16, *Special Designations*. As indicated in Table 3.13-1, four wilderness areas are located within 20 miles of the project site: the Chuckwalla Mountains Wilderness, Palen/McCoy Wilderness, Joshua Tree Wilderness, and Little Chuckwalla Mountains Wilderness.

TABLE 3.13-1
RECREATION AREAS AND SPECIAL DESIGNATIONS WITH RECREATIONAL OPPORTUNITIES

Recreation Area	Approximate Direction from the Project site	Approximate Distance from the					Approximate Size
		Proposed Action	Reconfigured Alternative 1	Reconfigured Alternative 2 Option 1	Reconfigured Alternative 2 Option 2	Reduced Acreage Alternative	
Chuckwalla Desert Wildlife Management Area ACEC	southwest	0.25 mi; crossed by linear facilities	0.25 mi; crossed by linear facilities	0.25 mi; crossed by linear facilities	0.25 mi; crossed by linear facilities	0.25 mi; crossed by linear facilities	352,633 acres
Palen Dry Lake ACEC	northeast	0.5 mi	<.5 mi	1 mi	1 mi	1 mi	3,632 acres
Chuckwalla Mountains Wilderness	south	1.5 mi	1.5 mi	1.5 mi	1.5 mi	1.5 mi	99,548 acres
Palen/McCoy Wilderness	northeast	1.25 mi	1.5 mi	2 mi	2 mi	2 mi	236,488 acres
Corn Springs ACEC	southwest	4.5 mi	4.5 mi	4.5 mi	4.5 mi	4.5 mi	2,467 acres
Alligator Rock ACEC	west	5 mi	5 mi	5 mi	5 mi	5 mi	7,754 acres
Desert Lily Preserve ACEC	northwest	5 mi	5.5 mi	5 mi	5 mi	5 mi	2,055 acres
Joshua Tree National Park	northwest	7 mi	7.5 mi	7 mi	7 mi	7 mi	1,017,748 acres
Joshua Tree Wilderness	northwest	7 mi	7.5 mi	7 mi	7 mi	7 mi	594,502 acres
Little Chuckwalla Mountains Wilderness	southeast	14 mi	12.5 mi	13 mi	13 mi	13 mi	28,034 acres
Chuckwalla Valley Dune Thicket ACEC	southeast	15.5 mi	14 mi	14.5 mi	14.5 mi	14.5 mi	2,273 acres
Corn Springs Campground	southwest	6.5 mi	6.5 mi	6.5 mi	6.5 mi	6.5 mi	9 camping units
Bradshaw Trail Back Country Byway	south	17 mi	17 mi	17 mi	17 mi	17 mi	65 miles long

SOURCE: BLM, 2009; BLM, 2002; Nelson, 2010.

The Wilderness Act limits allowable types of recreation on wilderness lands to those that are primitive and unconfined, depend on a wilderness setting, and do not degrade the wilderness character of the area. Motorized or mechanized vehicles or equipment for recreational purposes are not permitted in wilderness (916 USC 1133(c)). The BLM regulates such recreation on lands within its jurisdiction in accordance with the policies, procedures and technologies set forth in the Code of Federal Regulations (43 CFR 6300), BLM Manual 8560 (*Management of Designated Wilderness Areas*) (BLM, 1983), BLM Handbook H-8560-1 (*Management of Designated Wilderness Areas*) (BLM, 1985), and BLM's Principles For Wilderness Management In The California Desert (BLM, 1995). More specifically, camping, hiking, rockhounding, hunting, fishing, non-commercial trapping, backpacking, climbing, and horseback riding are permissible (BLM, 1988; BLM, 1983). By contrast, physical endurance contests (such as races, competitive trail rides and survival contests), commercial recreational activities, and the use of motorized or mechanized vehicles (including OHVs, aircraft and motor boats) generally are prohibited (16 USC 1133(c); BLM, 1995; BLM, 1988; BLM, 1983).

The four wilderness areas in the vicinity of the project site have no developed trails, parking/trailheads, or other visitor use facilities. These areas are generally steep, rugged mountains, with no permanent natural water sources, thus limiting extensive hiking or backpacking opportunities. Visitor use within the wilderness areas is very light. Though BLM has no visitor use counts, the Desert Peaks Section of the Sierra Club's Angeles Chapter maintains a list of 99 desert peaks which members have climbed. The section also sponsors hikes to the desert peaks. Five of the peaks on the list are within 30 miles of the project site with the closest peak, Black Butte, being approximately 11 miles from the project site. None of the peaks directly overlook the project site, although the site may be visible from certain peaks, depending on elevation and topography. While total numbers of visitors is unknown, it is assumed to be very low due to the difficulty in reaching the peaks. However, two of the peaks (Granite and Black Butte) were featured as destinations in the 2010-2011Desert Peaks newsletter.

The peaks, elevation, legal description and location are included in Table 3-2 in order of relative distance from the project site:

TABLE 3.13-2
DESERT PEAKS WITHIN THE VICINITY OF THE PROJECT SITE

Desert Peak/ Elevation (ft)	Relative distance from site (air miles)	Legal Description	Special Designation
Black Butte/4,510	11 miles	T.7 S., R.16 E., Sec. 17	Chuckwalla Mountains Wilderness
Red Top/3,854	14 miles	T.4 S., R.18 E., Sec. 12	Palen McCoy Wilderness
Bunch/3,451	18 miles	T.8 S., R.17 E., Sec. 26	Chuckwalla DWMA/ACEC
Granite/4,356	21 miles	T.2 S., R.18 E., Sec. 27	Palen McCoy Wilderness
Eagle Mountain/5,347	29 miles	T.5 S., R.12 E., Sec. 9	Joshua Tree National Park

Observations by staff and Law Enforcement Rangers indicate only 100 - 200 hikers per year within all the wilderness areas near the project site. More popular is vehicle camping along roads that are adjacent to the wilderness areas. RV camping near wilderness areas, with associated hiking, OHV use, photography, sightseeing, etc. accounts for up to 2,000 visitors per year.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are shown in Figure 3.16-1 and described in Section 3.16, *Special Designations*. As indicated in Table 3.13-1, six ACECs are located near the site: the Chuckwalla Desert Wildlife Management Area ACEC, Palen Dry Lake ACEC, Corn Springs ACEC, Alligator Rock ACEC, Desert Lily Preserve ACEC, and Chuckwalla Valley Dune Thicket ACEC. Recreation activities allowed in ACECs are determined by the resources and values for which the ACECs were established, and by the associated ACEC Management Plan. Most ACECs allow low-intensity recreation use that is compatible with protection of the relevant values.

The Alligator Rock and Corn Springs ACECs primarily protect cultural resources. The Chuckwalla Desert Wildlife Management Area (DWMA) and Desert Lily ACECs protect sensitive wildlife and plant species, while Chuckwalla Valley Dune Thicket and Palen Dry Lake ACECs protect both natural and cultural resources. Other than Corn Springs, these ACECs do not have recreation use facilities, but are signed to inform visitors of the special values of the areas and associated protection measures. Other than the campground in the Corn Springs ACEC, BLM has no visitor counts for these sites, but observations and patrols indicate very low use, in the hundreds per year.

Long Term Visitor Areas

The BLM manages seven Long Term Visitor Areas (LTVAs), which accommodate visitors who wish to camp for as long as seven consecutive months. Five are in California and two are in Arizona. None is located within 20 miles of the project site. The closest LTVAs to the site are the Mule Mountains LTVA, approximately 25 miles east, and the Midland LTVA, which is approximately 36 miles east. See Figure 3.16-1.

Two campgrounds are located within the boundaries of the Mule Mountains LTVA: Wiley's Well and Coon Hollow Campgrounds. Both are year-round facilities with campsites, picnic tables, grills, shade ramadas and handicapped-accessible vault toilets. (BLM, 2010 [Trigo Mountains]).

Table 3.13-3 provides average recreational use information for these facilities.

TABLE 3.13-3
AVERAGE RECREATION USE AT DEVELOPED SITES 2007-2009

Recreation Fee Site	Average Annual # of Camping Permits	Average Annual Recreation Visits
Corn Springs Campground	186	1,184
Midland LTVA	41	2,826
Mule Mountain LTVA	135	5,545
Total	362	9,555

SOURCE: Use Data from BLM Recreation Management Information System-RMIS

Other Recreational Areas and Opportunities

The Bradshaw Trail

The Bradshaw Trail is a 70-mile Back Country Byway in Southeastern Riverside County, with a small segment in Imperial County. This east-west trail is located about 17 miles south of the project site, and extends from about 12 miles east of the community of North Shore near the Salton Sea State Recreation Area to about 14 miles southwest of Blythe near the Colorado River (see Figure 3.16-1). It was the first road through Riverside County, blazed by William Bradshaw in 1862 as an overland stage route beginning in San Bernardino, California, and ending at Ehrenberg, Arizona. The trail was used extensively between 1862 and 1877 to transport miners and passengers. The trail is a dirt road that traverses mostly public land between the Chuckwalla Mountains and the Chocolate Mountain Aerial Gunnery Range. Four-wheel-drive vehicles are recommended due to stretches of soft sand (BLM, 2009). Recreational opportunities along the Bradshaw Trail include four-wheel driving, wildlife viewing, plant viewing, birdwatching, and scenic drives. All commercial activities require a land use or special recreation permit from the BLM. Fourteen-day camping limits apply on public lands. Primitive vehicular camping is allowed within 300 feet of the trail except in designated wilderness areas, several of which are nearby. Wilderness areas are closed to all motorized and mechanical vehicles, including bicycles (BLM, 2009).

3.14 Social and Economic Setting

3.14.1 Social

This section describes the social and economic background and existing conditions in the proposed action area, which is located in the eastern portion of unincorporated Riverside County. The proposed action area is located approximately 40 miles west of the City of Blythe and 10 miles east of the community of Desert Center. Additionally, this section discusses applicable plans, policies, and regulations that represent the social aspirations, community characteristics, and desired lifestyle, values, and goals of the stakeholders. These plans, policies, and regulations are necessary to understanding social group concerns in the context of renewable energy development. Information in this section is based on regional and national sources as well as input received from members of the public during the scoping process. The primary comments and concerns related to socioeconomic conditions were raised during scoping and were associated with the economic effects of construction, implementation, and operation of the project.

Applicable Plans, Policies and Regulations

Riverside County

Local goals and policies for Riverside County's future planning are described within the County's General Plan. The following General Plan goals and policies are relevant to evaluating how socioeconomic resources may be affected by the proposed action (Riverside, 2008):

1. *Land Use Policy 1.1*: Allow for the continued occupancy, operation, and maintenance of legal uses and structures that exist at the time of the adoption of the General Plan and become non-conforming due to use, density, and/or development requirements.

2. *Land Use Policy 1.*5: The County shall participate in regional efforts to address issues of mobility, transportation, traffic congestion, economic development, air and water quality, and watershed and habitat management with cities, local and regional agencies, stakeholders, Indian nations, and surrounding jurisdictions.

3. *Land Use Policy 7.*1: Accommodate the development of a balance of land uses that maintain and enhance the County's fiscal viability, economic diversity, and environmental integrity.

4. *Housing Element Goal 1*: To assist in the development of adequate housing to meet the County's fair share of the region's housing needs for all economic segments of the population, with an emphasis on lower income households and households with special needs.

5. *Housing Element Goal 2*: To conserve and improve the condition of the housing stock, particularly affordable housing.

Additional local goals and policies for Riverside County's future planning are described within the County of Riverside General Plan/Desert Center Area Plan. The following goals and policies listed in this Plan are also relevant to evaluating how socioeconomic resources may be affected by the proposed action (County of Riverside, 2008):

1. *Desert Center Area Plan (DCAP)_Policy 1.1:* Development and operations within (Policy) areas shall be in accordance with Specific Plans #305 (Eagle Mountain Landfill) and 306 (Eagle Mountain Townsite).
2. *DCAP Policy 2.2:* Provide for a balance of housing, services, and employment uses such that Desert Center and Lake Tamarisk residents and/or employees can access necessary services or facilities such as health care, housing, employment, food, recreational, and entertainment facilities.
3. *DCAP Policy 2.*3: Assure that the design of new land uses subject to discretionary review visually enhances, and does not degrade, the character of the Desert Center region.

City of Blythe

The main local plans, policies, and goals for the City of Blythe's future community development are described within the City's General Plan and the City's Redevelopment 2005-2009 Implementation Plan. The following General Plan goals are relevant to evaluating how socioeconomic resources may be affected by the proposed action (Blythe, 2007):

1. *Land Use Policy 1*: Preserve the scale and character of established neighborhoods.
2. *Land Use Policy 2*: Encourage new residential growth in the form of neighborhoods.
3. *Land Use Policy 6*: Provide for appropriate relationships between higher density and lower density residential areas, and require buffers of varying size between residential uses and non-residential uses without restricting foot and bicycle access.
4. *Land Use Policy 19*: Ensure that industrial development is compatible with and does not adversely affect the natural environment.
5. *Housing Element Goal 1* (Overall Housing Production): Provide housing to meet the present and future needs of residents in the City of Blythe and to aim at providing a fair share of the area housing needs, within identified governmental, market, economic and natural constraints.
6. *Housing Element Goal 2* (Housing Affordability): Facilitate the development of programs that will provide quality housing for those who otherwise would have difficulty affording such housing at market rates. Specifically, such programs will be directed at low and particularly very low income groups.
7. *Redevelopment Agency Goal 1*: Preserve and enhance the economic prosperity of the community and aid business development and retention.

City of Coachella

The main local plans, policies, and goals for the City of Coachella's future community development are described within the City's General Plan. The following General Plan goals are relevant to evaluating how socioeconomic resources may be affected by the proposed action (Coachella, 2008):

1. *Land Use Goal 1:* The City shall plan for a diversity of residential densities and housing types for the current and future needs of Coachella residents.

2. *Land Use Goal 2:* Strive to improve the existing neighborhoods, including the housing stock, the infrastructure and the quality of life.

3. *Land Use Goal 3:* Encourage commercial development that meets the needs of the residents, neighborhoods and the community and that attracts shoppers from the regional commercial market.

4. *Land Use Goal 4:* The City shall establish sufficient industrial areas to provide a diversified economy and a stable employment base for Coachella's residents.

5. *Land Use Goal 5:* The City shall contain ample amounts and varying types of open space and agriculture for its scenic, recreational and economic contribution to Coachella's quality of life.

6. *Land Use Goal 6:* The City shall contain sufficient land for public purposes.

7. *Land Use Goal 7:* The City shall recognize and incorporate existing approved master plans and major highways.

8. *Land Use Goal 8:* The City shall organize the community to participate in the implementation of the General Plan goals, objectives and policies utilizing the existing organizational structure based on the eight colonias.

9. *Land Use Goal 9:* The growth of the City shall be based on fiscally responsible decisions regarding its ability to provide services and to meet the needs of developing adjacent land outside the corporate limits.

10. *Economic Development Goal:* The City shall create an economic climate which is supportive of existing business and which will attract new business and tourism.

11. *Housing Element Goal 1:* To provide adequate housing in a satisfying living environment for all persons regardless of age, race, ethnic background, national origin, religion, family size, marital status, handicap or any other arbitrary factor

12. *Housing Element Goal 2:* To provide housing which is affordable to low and moderate income households

13. *Housing Element Goal 3:* To maintain and conserve the existing housing supply in a safe and serviceable condition while eliminating housing deficiencies and preventing further deterioration

14. *Housing Element Goal 4:* Arbitrary housing discrimination based on race, religion, ethnic origin, marital status, age, sexual orientation or physical characteristics is to be eliminated

15. *Housing Element Goal 5:* To provide a means by which the citizens may furnish a meaningful contribution to the realization of the overall housing goals of the community

City of Indio

The main local plans, policies, and goals for the City of Indio's future community development are described within the City's General Plan. The following General Plan goals are relevant to evaluating how socioeconomic resources may be affected by the proposed action (Indio, 2004):

1. *Goal LU-1:* To plan for a city with a diversity of residential opportunities and lifestyles to fit the current and future needs of Indio.

2. *Goal LU-2:* In portions of the Planning Area that have large amounts of undeveloped land under a few ownerships, provide the tools and flexibility to guide the development of these area to achieve a range of housing opportunities with higher than average amenity packages. Areas requiring this added level of planning are designated with a Residential Planned Development (RPD) overlay designation unique to that area.

3. *Goal LU-3:* To plan for a range of commercial sites within the Planning Area to serve the needs of those living, working, and visiting Indio. These commercial areas will provide a range of commercial opportunities in line with the needs of the above groups, and will continue to develop Indio as the retail center of Eastern Coachella Valley.

4. *Goal LU-4:* Provide additional guidelines for the development of key areas within Indio in order to encourage master planned commercial developments with a strong sense of identity and high levels of design. These areas will be designated with a Commercial Planned Development (CPD) designation unique to that area.

5. *Goal LU-5:* Provide additional guidelines for the development of medical centers needed to support the population in Indio and the surrounding region.

6. *Goal LU-6:* To enhance the employment base of Indio through the provision of adequate lands dedicated to industrial use and to take advantage of the City's Enterprise Zone.

7. *Goal LU-7:* Provide a development framework for the reuse of the areas within and adjacent to the railroad corridor that provides opportunities for the development of manufacturing, transportation, and commercial uses while maintaining the historic significance of the railroad center.

8. *Goal LU-8:* To plan for areas for the provision of public and quasi-public services, such as schools, libraries, police and fire facilities, government centers, and other related facilities that area of a size and location to efficiently serve the current and future population of Indio.

9. *Goal LU-9:* To provide a range of active and passive recreational areas as well as provide areas for the preservation of the natural environment.

10. *Goal LU-10:* Provide areas in the community that encourage the combination of commercial, medium/high density residential, and active and passice open space uses within an area to create a vibrant village atmosphere dominated by pedestrian oriented land uses.

11. *Goal LU-11:* Recognize the need for flexibility in design of large development projects, and allow the adoption of City or developer provided specific plans that will become the guiding document used in the approval of future projects within their boundaries.

12. *Goal ED-1:* Provide the City with the tools needed to promote a balanced economic growth with sufficient fiscal resources to provide for the necessary infrastructure, and public and community services.

13. *Goal H-1:* The community of Indio will ensure that adequate supplies of dwelling units are developed to provide a wide range of housing types, price ranges, and sizes to all sectors of the population.

14. *Goal H-2:* The City will maintain the integrity of existing residential areas so residents can continue to enjoy these areas.

15. *Goal H-3:* Provide housing opportunities that are affordable to moderate, low, and very low income groups.

Social Conditions

The proposed action includes the construction and operation, and ultimately the closure and decommissioning, of a solar energy generating facility located in the Southern California inland desert, approximately 60 miles east of the City of Indio and approximately 40 miles west of the City of Blythe, in eastern Riverside County, California (CEC RSA, 2010).

The expected catchment area for the project's construction workers' daily work commuting is a primary determinant for the affected social and economic environment associated with the project. As discussed in more detail in Section 4.13, *Social and Economic Impacts*, the origin of the project workers likely would be a central factor determining the magnitude and extent of the proposed action's potential socioeconomic impacts to the local and regional communities and economy. The direct benefits of employment and higher personal incomes will primarily benefit the communities where workers and their families reside because these communities would likely be where employees spend most of their earnings. Workers' spending for goods and services also would have an indirect effect on the communities and economies where that spending occurs and result in added secondary employment.

If the number of suitable workers to staff the proposed action locally or in the region is insufficient, then the project could attract individuals to relocate to the area (either temporarily or permanently). Additional new residents consequently could result in increased demand for housing and local services.

There is little research and analysis providing guidance for determining the socioeconomic impact area boundaries for power facilities. The referenced EPRI analysis (CEC RSA, 2010) is widely cited as research showing that workers may commute as much as two hours each direction from their communities rather than relocate (CEC RSA, 2010). Recent testimony by a representative of the Riverside/San Bernardino Building Trades Council also stated that construction workers associated with the proposed action would commute daily two to three hours each way (CEC RSA, 2010).

However, the common representation of the EPRI study findings may overestimate the likelihood of construction workers commuting *daily* for project-related employment and appears to misrepresent the cited EPRI report findings. The EPRI study importantly distinguishes between "daily commuting," "weekly commuting" and relocation (or in-migration). The EPRI study also acknowledges a prevalence of weekly commuting for power projects and reported 1.42 hours as the average "construction workers maximum daily commuting time" observed amongst its 12 case studies. The study also estimated that the average maximum daily commute distance was 73 miles.[1] The report also identifies other factors (e.g., quality of life) that determine whether commuting (daily and weekly) versus relocation is likely to occur.

In addition, from its case studies, the EPRI study also determined that "(o)verall, the proportion of in-migrants ranges from 5 to 50 percent for construction workers and 5 to 84 percent for operating staff." Furthermore, the study observed that: "(1) more in-migration is required in rural, remote areas; (2) the existence of a regional work force experienced in power plant construction reduces in-migration; (3) weekly commuting is more widely practiced in the West, or in rural areas."

For the affected socioeconomic environment and analysis, the DEIS recognizes the rural nature of eastern Riverside County and conservatively assumes that a two-hour daily commute radius defines the regional study area. Figure 3.14-1 depicts contours from the site up to a two-hour commute shed to show the potential estimated travel time for project workers' commutes to the site.

Figure 3.14-1 shows the two-hour commute shed estimated by ESA based on similar analysis by AECOM (CEC RSA, 2010). The commute area is shown to extend into parts of San Diego, Imperial and San Bernardino counties in California. The commute radius also extends east into both La Paz and western Maricopa County in Arizona and westwards to Banning in Riverside County. The northwestern boundary for commute radius includes the small community of Morongo Valley in San Bernardino County north of its border with Riverside County.

Because no major populated urban centers occur within the commute radius in the counties of San Diego, Imperial and Maricopa, these areas are not included in the regional study area for the proposed action. The community of Twentynine Palms is shown to be within the outermost limits of the two-hour radius; however, given both the relatively poor roadway connection along Route 62 (suggesting that actual commute time may be higher) and the prevalence of other solar projects closer to these communities, it is expected that relatively few if any San Bernardino County residents would commute daily to work at the project site. Consequently, the social and economic analysis covers predominantly of eastern Riverside County in California and La Paz County in Arizona. In addition, the small city of Twentynine Palms, the community of Morongo Valley, and their respective nearby unincorporated areas of San Bernardino County are included in the regional study area.

As a conservative assumption, the western limit for the two-hour commute area extends only as far as the community of Banning in contrast to the previous AECOM analysis, which suggested that Moreno Valley and Redlands would be within a daily two hour commute of the project site.

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1 This estimate was strongly influenced by one project (Laramie River) that reported a maximum daily commute distance of 115 miles.

The slightly smaller drive-time radius is considered a more realistic representation of actual typical drive time conditions from the project site. Furthermore, adopting this slightly smaller regional study area, the subsequent socioeconomic impact analysis will be more conservative in its evaluation of potential project employment-related adverse impacts.

As required by the BLM Land Use Planning Handbook, Appendix D requirements (BLM, 2005), the analysis of a proposed action of this type needs to consider existing socioeconomic conditions and impacts on several geographic scales. An analysis at a local level presents a challenge because the proposed action is in a sparsely populated area, with the largest urban center being the City of Riverside, located approximately 120 miles west of the site.

Based on BLM guidelines, a reasonable study area for localized socioeconomic impacts would, at a minimum, include the four nearest communities: the City of Blythe, California (approximately 40 miles east of the site); the very small community of Desert Center, California; the City of Ehrenburg, Arizona (approximately 45 miles east of the site); and the Town of Quartzsite, Arizona (approximately 57 miles east of the site). These cities represent all the major communities located within an hour commute of the site and therefore together represent the local study area for the proposed action. The cities of Indio and Coachella are estimated to be just over an hour's drive away from the project site and therefore are considered within the analysis's regional study area.

Population

The current population estimates and recent growth trends for both the regional and local study areas are summarized in Table 3.14-1. All the cities determined to be located within a two-hour commute of the site are shown. In addition, data for Riverside, San Bernardino, and La Paz Counties are presented.

Zip code population estimates were used to estimate the approximate size and location of the residential populations within the unincorporated areas of eastern Riverside County located within the two-hour commute distance of the site. Figure 3.14-1 also shows both the five digit zip code areas and the 2010 estimated population living within each zip code. The unincorporated communities of Cabazon, Desert Center, Mecca, Thermal and Thousand Palms are represented within the unincorporated area population estimates of Riverside County. The unincorporated community of Morongo Valley also is represented within the unincorporated area population estimates of San Bernardino County. While the population estimates for the unincorporated areas are only approximate, Figure 3.14-1 shows that the areas east of Coachella are very sparsely populated and that most of the population within the regional study area lives more than a 90-minute drive from the site. The total population of eastern Riverside County within the regional study area is estimated to be 521,707, which represents approximately 24.4 percent of Riverside County's total population. The majority of this population resides in the Coachella Valley.

Housing

Current housing conditions for the regional and local study areas are summarized in Table 3.14-2. All the cities determined to be located within a two-hour commute of the site are shown. In addition, Table 3.14-2 also presents data for Riverside, San Bernardino, and La Paz Counties.

TABLE 3.14-1
POPULATION PROFILE OF THE REGIONAL STUDY AREA

Population			
	Year		
Area	2000 Population	2010 Population	Average Annual Growth Rate (2000 – 10)
Riverside County, CA	1,545,387	2,139,535	3.3%
Blythe	20,465	21,812	0.6%
Coachella	22,724	42,591	6.5%
Indio	49,116	83,675	5.5%
Indian Wells	3,816	5,144	3.0%
La Quinta	23,694	44,421	6.5%
Palm Desert	41,155	52,067	2.4%
Rancho Mirage	13,249	17,006	2.5%
Cathedral City	42,647	52,841	2.2%
Palm Springs	42,805	48,040	1.2%
Desert Hot Springs	16,582	26,811	4.92%
Banning	23,562	28,751	2.00%
Unincorporated Area[a]	64,269	99,322	4.5%
Eastern Riverside County, CA	364,084	522,481	3.6%
San Bernardino County, CA	1,710,139	2,073,149	1.9%
Twentynine Palms[b]	14,764 (est)	16,877	1.4%
Unincorporated Area	5,890	10,580	6.0%
South San Bernardino County, CA	20,654	27,457	2.9%
La Paz County, AZ	19,715	21,616 [c]	0.9%
Ehrenburg	1,357	1,488 [c](est)	0.9%
Quartzite	3,354	3,731 [c]	1.1%
Cibola	172	189 [c] (est)	0.9%
Unincorporated Area[d]	4,226	4,621	0.9%
Western La Paz County, AZ	9,109	10,029	1.0%
Local Study Area[e]	25,176	26,781	0.7%
Regional Study Area	392,908	559,968	3.5%

NOTES: CA Cities are shown (by County) in order of their relative distance from the project site.

[a] Adjusted to remove Chuckwalla and Iron Wood State Prison population.
[b] Estimated population to adjust for Twentynine Palms Military Base.
[c] 2009 Data
[d] Consists of entire remainder of La Paz County except for the population of the City of Parker (3,401) and the estimated Colorado River Reservation population (8,186).
[e] Blythe, CA; Ehrenburg, AZ and Quartzite, AZ.

SOURCE: California Department of Finance, 2010; Arizona Department of Commerce, 2010.

TABLE 3.14-2
HOUSING PROFILE OF THE REGIONAL STUDY AREA (2010)

Housing		
	Year	
Area	2010 Total Housing Units	2010 Vacancy Rate
Riverside County, CA	784,357	13.0%
Blythe	5,472	16.1%
Coachella	9,145	4.4%
Indio	28,167	18.0%
Indian Wells	5,025	48.4%
La Quinta	21,491	28.5%
Palm Desert	34,425	30.9%
Rancho Mirage	13,542	38.6%
Cathedral City	21,527	21.5%
Palm Springs	33,603	33.4%
Desert Hot Springs	11,073	16.7%
Banning	11,644	8.4%
Unincorporated Area	36,990 (est)	15.3%
Eastern Riverside County, CA	232,104	23.7%
San Bernardino County, CA	693,712	11.58%
Twentynine Palms	9,228	14.7%
Unincorporated Area	4,650 (est)	28.3%
Eastern San Bernardino County, CA	13,878	19.3%
La Paz County, AZ	16,765 [a]	45.0% [a]
Ehrenburg	824 [b]	34.9% [b]
Quartzite	3,541 [a]	41.9% [b]
Cibola	161 [b]	60.0% [b]
Unincorporated Area[c]	4,262 [a] (est)	49.5% [a]
Western La Paz County, AZ	8,788 [a]	45.3% [a]
Local Study Area[d]	9,837	25.2%
Regional Study Area	219,328	25.0%

NOTES: CA Cities are show (by County) in order of their relative distance from the project site.

a 2009 Data
b 2000 Data
c Consists of entire remainder of La Paz County except for the population of the City of Parker (3,401) and the estimated Colorado River Reservation population (8,186).
d Blythe, CA; Ehrenburg, AZ and Quartzite, AZ.

SOURCE: California Department of Finance, 2010; Arizona Department of Commerce, 2010.

In 2010, Riverside County had 784,357 total housing units, with a vacancy rate of 13.0 percent. However, vacancy rates vary widely across this large county and are particularly high in the Coachella Valley communities. Overall, the regional study area contains a high number of housing units, with La Paz County communities having the highest vacancy rates.

Among the cities in Riverside County relevant to the proposed action,[2] Indian Wells has the highest vacancy rate (48.4 percent), and Palm Desert has the highest number of vacant housing units, with 11,223. Among the cities in La Paz County relevant to the Project, Cibola had the highest vacancy rate (60.0 percent), but Quartzsite had the highest number of vacant units at 1,336.

Population Projections

The forecasted population trends for Riverside, San Bernardino, and La Paz Counties are shown in Table 3.14-3. The projected population growth for eastern Riverside County is estimated based on the county-wide growth projections. Population growth in Riverside County is expected to slow over the next few decades. The growth rate is projected to be 3 percent per year between 2010 and 2020, and then to fall to 2.1 percent per year between 2020 and 2030. The population projections discussed above were made prior to the economic recession that began in 2008, likely explaining the decrease in the 2010 actual population estimate for Riverside County and that previously estimated for the future population growth projections.

TABLE 3.14-3
POPULATION PROJECTIONS FOR RIVERSIDE COUNTY AND THE REGIONAL STUDY AREA

Population				
	Year			
Area	2010 Actual Population	2010 Projected Population	2020 Projected Population	2030 Projected Population
Riverside County, CA	2,139,535	2,239,053	2,904,848	3,507,498
Eastern Riverside County, CA[a]	521,707	545,974	708,322	855,273
San Bernardino County, CA	2,073,149	2,177,596	2,582,777	2,957,744
South San Bernardino County, CA[a]	27,457	28,840	34,207	39,173
La Paz County, AZ	21,544	22,632	25,487	28,074
Western LaPaz County, AZ[a]	10,029	10,535	11,865	13,069
Regional Study Area	559,193	585,349	754,393	907,514

NOTES:
a Estimates based on Countywide growth projections.

SOURCE: CEC RSA 2010; ESA, 2010.

2 The high vacancy rates for the affluent cities of Indian Wells and Rancho Mirage primarily reflect a large proportion of vacation homes and these cities are not expected to provide much of the project workers population.

Temporary Housing Resources

Rental Homes

Table 3.14-2 shows that vacancy rates are high in the study area. Based on reported current vacancy rates for the City of Blythe, approximately 881 housing units are unoccupied in 2010 and may be available for rental (or purchase) by future PSPP workers. Similarly, the data also suggests that up to 1,594 local housing units may be available within the city of Ehrenburg and the town of Quartzsite, Arizona (CEC RSA, 2010).

However, the condition, suitability, and availability of the existing housing resources for use as temporary housing for project-related construction workers are unknown. In addition, as shown by the high vacancy rates elsewhere in the region study area, some "vacant" homes may be second homes and, therefore, less available for use as temporary housing.

Hotel and Motel Accommodations

In addition to the existing residential units, project construction workers and operational workers could use local lodging facilities as temporary housing. Hotel/motel lodging suitable for potential temporary housing use typically is concentrated in urban areas or near major transportation nodes. For the purposes of this analysis, only those hotels in the communities closest to the proposed action were tabulated under the assumption that construction and operations workers would congregate to those areas for commuting ease.

Data compiled by Smith Travel Research for hotels and motels with 15 or more rooms identified 19 hotels with a total of 878 rooms within the local study area in 2008, which presents the most current available data (CEC RSA, 2010). These hotels were all located in Blythe, the only community in California with hotels or motels with 15 or more rooms within one hour's driving distance of the site.

In addition, 120 hotel/motel rooms are located in Ehrenberg and another 22 rooms are located within the City of Quartzite, Arizona (Arizona Department of Commerce, 2010). The extent that the local motel and hotels within the local study area could provide temporary housing for project construction workers would depend both on the then-current room rates and occupancy rates. Typical room rates for most of the hotel/motels are currently relatively inexpensive during the off-season with quoted rates of $60 to $70 per night (not including tax). Provided operators would maintain comparable rates, these local hotel/motel rooms would likely be a possible temporary housing option, particularly for workers that might be willing to share accommodations.

Fifty-seven hotels with a total of 8,285 rooms were identified in communities located from 1 to 1.5 hours drive from the project site. These communities include Indio, Palm Desert, Indian Wells, and Rancho Mirage. Applying the 2008 average occupancy ratio (70.8 percent) suggests that, on average, 2,419 unoccupied rooms are available for rent within 1 to 1.5 hours drive of the project site. A total of 129 hotels with 7,541 rooms were identified in communities within 1.5 to 2 hours' drive from the project site (CEC RSA, 2010). These communities include Desert Hot Springs, Palm Springs, and Needles. Assuming an annual average occupancy rate of 70.8 percent, 2,202 unoccupied motel and hotel rooms were available for rent within 1.5 to 2 hours drive from the project site. Data was unavailable for local study area hotel/motel rooms located within Arizona, but there will likely be some unoccupied lodging available to workers.

The average annual occupancy rate for hotels in Riverside and San Bernardino Counties in 2007 was 70.8 percent (CEC RSA, 2010). Applying this ratio (70.8 percent) to the total number of hotel rooms identified within the local study area would suggests that, on average, in 2008 a total of 298 unoccupied rooms were available for rent in the local study area. However, given the seasonality of local tourism to the area, it is considered likely that higher occupancy and room rates would apply during the winter season (December to March), while higher vacancy rates and lower room rates would apply during the off-season (summer and early fall) when very hot local conditions persist.

The attractiveness of temporary housing resources for project construction workers generally would decrease further from the site. The size of some of these hotels and their location within more affluent communities make it likely that many of these hotels would have higher room rates and, therefore, and thus not suitable temporary housing for project workers.

Campground/RV Parks

Other housing opportunities are available in recreational vehicle (RV) facilities, mobile home sites, and campgrounds. Under some circumstances, these types of facilities could be usable by project construction workers as temporary housing. Generally, their lower cost for overnight use could make them more attractive as a potential temporary housing resource. Particularly for construction workers who may own their own RV or trailers, RV parks with utility hook-ups and other amenities would be more suitable for use during the summer and could serve as a longer-term rental for workers who prefer a weekly commute.

There are at least 10 RV parks located in the vicinity of Blythe, with a combined total of about 800 spaces (CEC RSA, 2010). RV parks in Blythe tend to be located along the Colorado River and receive higher levels of use during the summer. Research performed on a small sample of these RV parks suggests that a large number of spaces are occupied by year-round residents or are privately-owned and, therefore, unavailable for use by construction workers (CEC RSA, 2010). Additional RV parks are located in Ehrenberg and Quartzsite, Arizona, approximately four miles and 20 miles east of Blythe, respectively. The town of Quartzsite’s web site states more than 70 campgrounds are in the vicinity of the community. Typically the campgrounds are occupied between October and March, with visitors attracted to the gem, mineral, and swap meets and shows that are popular tourist attractions in the area (CEC RSA, 2010). Twenty local RV parks are identified by the Quartzite Chamber of Commerce as operating within Quartzite.

Long-term camping is available by permit in Long-Term Visitor Areas (LTVAs) on BLM lands. There are two LTVAs located near the Project site: Mule Mountains LTVA, which includes two primitive campgrounds, Wiley’s Well and Coon Hollow, and Midland LTVA, which is located north of the City of Blythe. BLM also operates another LTVA within the local study area at La Posa, south of Interstate 10 near Quartzsite, Arizona. LTVAs are intended for recreation use only and workers would generally not be permitted to use these areas (CEC RSA, 2010).

However, BLM may allow temporary LTVAs to be established on site for construction workers for the duration of project construction as temporary lodging facilities.[3]

Except for "special areas" with specific camping regulations, vehicle camping is allowed anywhere on BLM-administered land within 300 feet of any posted Open Route. There are, however, no facilities in these locations and there is a 14-day limit for camping in any one location. After 14 days, campers wishing to stay in the area longer are required to move 25 miles from their original camp site (CEC RSA, 2010).

Affected Groups and Attitudes

This section discusses some of the groups whom the proposed action could affect. Social effects to these groups and other stakeholders are discussed under Section 4.13, *Social and Economic Impacts*.

Classifying stakeholders into groups does not imply that other stakeholders who do not fit into a group are ignored or left outside of the social and environmental review process. Discussion of the affected groups is a means to highlight and facilitate framing issues related to the social concerns of some stakeholders who may have a particular local or regional relationship to the host landscape that may potentially be developed to exploit solar energy.

Blythe Area Chamber of Commerce

The Blythe Area Chamber of Commerce provides a forum for local businesses and residents on important community issues. The Chamber of Commerce maintains a directory of all the businesses in Blythe and promotes the city's business economy. The purpose of the Blythe Area Chamber of Commerce is to encourage and facilitate activities that improve the economic viability of this community, provide a forum for guidance and support, provide opportunities to inform, and seek funds necessary for implementing compatible activities that would improve this agricultural community.

Blythe/Palo Verde Valley Economic Development Partnership

The Blyth/Palo Verde Valley Economic Development Partnership is a consortium comprised of the community college workforce and economic development leadership within the Blythe/Palo Verde Valley region. The consortium received funding from the California Community Colleges to enhance the consortium's capacity to support economic and workforce development efforts within its rural and remote sub-regions. This partnership consists of representatives from the City of Blythe, Palo Verde Valley College, Blythe Chamber of Commerce, Riverside County, Palo Verde Unified School District, Palo Verde Irrigation District, and other community and regional representatives. Members of the partnership generally have supportive attitudes toward renewable energy projects, and believe that these types of projects will help the local area's economy (Blythe/Palo Verde Economic Development Partnership, 2010).

[3] There are two other campgrounds in the local area: Corn Springs (located 7.5 miles southwest) operated by the BLM and Cottonwood Springs (36 miles west) operated by the NPS. However, due to their use restrictions and conditions both would not be suitable for construction workers use.

Environmental Groups

Several national and local groups have concerns about the siting criteria used for renewable energy projects proposed for development in sensitive biological resource areas. Environmental groups also have concerns regarding impacts on wildlife movement corridors, impacts on special status species associated with the implementation of solar panels (e.g., shading effects on species), and greenhouse gas emission impacts on plants and wildlife (CEC RSA, 2010) to name a few.

Recreational Users

Recreational users include OHV users, hikers, campers and wildlife viewing enthusiasts. The recreational user group has a deep appreciation for the natural high desert landscape, and their social attitudes are participatory and protective of this resource. This group is concerned with the indirect impacts associated with the displacement of recreational lands with solar energy facilities, including the cumulative loss of land available for OHV recreational uses (CEC RSA, 2010).

Local Private Land Owners and Residents

Local private land owners with properties that are in the vicinity of the proposed action have mostly positive attitudes toward renewable energy development. However, some area landowners and residents oppose major change to the desert environment and are concerned about permanent changes to the natural desert environment and wildlife. Others appear to be largely indifferent to the proposed action. Nonetheless, because the area is in an economic recession, many residents and landowners support of new local employment opportunities and revenues that the new renewable energy development project would bring to the local area at least in the near term.

Project Workers and Suppliers to the Renewable Energy Industry

The proposed action has the potential to affect both local and non-local labor force from surrounding areas and the nation. Construction and operation of the proposed action would require both temporary and permanent workers. Since the area is in the midst of a recession, social attitudes towards future employment opportunities are generally supportive.

3.14.2 Economic

Employment statistics by industry sector and county for 2008 are summarized in Table 3.14-4. Government is Riverside County’s largest employer. Governmental employment accounts for over 17 percent of the total jobs in the County. Additional important industries in the area include natural resources, mining, and construction; manufacturing; transportation; trade (wholesale and retail); information; financial activities; and services (e.g., professional, business, educational, health). In Riverside County, natural resources, mining and construction, government, and retail trade services are the leading industry groups in terms of employment.

TABLE 3.14-4
EMPLOYMENT BY INDUSTRY GROUP – 2008

Industry Group	Riverside County Employment		San Bernardino County Employment		La Paz County Employment	
	Total	Percent of Total	Total	Percent of Total	Total	Percent of Total
Agriculture	13,800	2.3%	2,967	0.3%	323	5.65%
Natural Resources, Mining, and Construction	55,100	9.3%	57,660	6.5%	289	5.05%
Manufacturing	48,600	8.2%	63,634	7.2%	218	3.81%
Transportation, Warehousing, and Utilities	21,400	3.6%	63,164	7.2%	146	2.55%
Wholesale Trade	20,400	3.4%	40,192	4.6%	n/a	n/a
Retail Trade	84,200	14.2%	106,217	12.1%	1,340	23.43%
Information	7,700	1.3%	8,949	1.0%	n/a	n/a
Financial Activities	22,300	3.8%	29,563	3.4%	515	9.01%
Professional and Business Services	57,700	9.7%	151,391	17.2%	161	2.82%
Educational and Health Services	58,800	9.9%	96,586	11.0%	n/a	n/a
All Other Services	94,300	15.9%	120,791	13.7%	261	4.56%
Government	110,200	18.5%	139,329	15.8%	2,465	43.11%
Total	**594,500**	**100%**	**880,443**	**100.0%**	**5,718**	**100.00%**

SOURCE: California EDD, 2010a; Bureau of Economic Analysis, 2010.

Labor Force

The labor force of the study area counties and communities is presented in Table 3.14-5. As of May 2010, Riverside County had a labor force of 909,400 workers, of which 782,400 were employed. Consequently, Riverside County's unemployment rate was 14 percent - considerably higher than the statewide unemployment rate of 11.9 percent. Blythe has a labor force of 7,100 workers. In addition, the labor force and employment estimates for the unincorporated area within the proposed project's regional study area were based on the County-wide average. As of May 2010, Twentynine Palms had a labor force of 6,200, of whom 5,200 were employed (the population of the Twentynine Palms military base has been excluded because those residents would not be available to work at the proposed solar facility). Consequently, Twentynine Palms's unemployment rate was 17.1 percent – also considerably higher than the statewide unemployment rate.

In Arizona, La Paz County had an estimated average labor force of 7,875 workers over the first four months of 2010. No 2010 sub-County area labor force data are available. Therefore, labor force estimates for the sub-County areas were based on 2008 data and adjusted for subsequent population growth. The estimated total labor force for the local study area is 8,480 workers. The total estimated labor force for the regional study area is 238,245 workers.

TABLE 3.14-5
LABOR FORCE AND UNEMPLOYMENT DATA FOR THE REGIONAL STUDY AREA

Jurisdiction	Civilian Labor Force	Total Employment	Number Unemployed	Unemployment Rate	Median Household Income[a]
Riverside County	919,200	780,600	132,600	14.5%	$60,085
Blythe	7,100	5,900	1,200	16.7%	$39,187
Coachella	12,300	9,600	2,700	21.7%	$41,797
Indio	27,200	23,100	4,100	15.1%	$55,598
Indian Wells	1,700	1,600	100	5.0%	$122,983 [b]
La Quinta	14,600	13,500	1,100	7.4%	$81,498
Palm Desert	24,700	22,700	2,100	8.4%	$57,038
Rancho Mirage	6,400	5,600	800	12.5%	$78,284 [b]
Cathedral City	26,100	22,500	3,600	13.7%	$43,411
Palm Springs	26,100	23,200	2,800	10.9%	$46,632
Desert Hot Springs	9,600	7,600	1,900	20.2%	$39,733
Banning	11,700	9,700	1,900	16.5%	$40,849
Unincorporated Area	58,400 (est)	50,200 (est)	8,200 (est)	14.5%	na
Eastern Riverside County, CA	225,900	195,200	30,500	13.5%	na
San Bernardino County, CA	866,500	742,700	123,800	14.3%	$58,440
Twentynine Palms	6,200	5,200	1,100	17.1%	$44,879
Unincorporated Area	3,000 (est)	2,600 (est)	400 (est)	14.3%	na
Southern San Bernardino County, CA	9,200	7,800	1,500	16.3%	na
La Paz County, AZ	7,875	7,150	725	7.6%	$31,812
Ehrenberg	645 (est)	595 (est)	50 (est)	7.6%	$35,330 [b]
Quartzsite	735 (est)	680 (est)	55 (est)	7.6%	$30,165 [b]
Cibola	80 (est)	75 (est)	5 (est)	7.6%	$28,420 [b]
Unincorporated Area	1,685 (est)	1,555 (est)	130 (est)	7.6%	na
Western La Paz County, AZ	3,145	2,905	240	7.6%	na
Local Study Area	8,480	7,175	1,305	15.4%	na
Regional Study Area	238,245	205,905	32,240	13.5%	na

NOTES:
a 2005-2007 Census average converted in 2010 dollar values.
2 2000 Census data converted in 2010 dollar values.

SOURCE: California EDD, 2010; U.S. Census, 2010; U.S. Census 2000; Arizona Department of Commerce, 2010.

Unemployment Rates

The unemployment rate for Riverside County in May 2010 was 14.5 percent. In Riverside County, the community with the highest unemployment rate is the City of Coachella (21.7 percent). Reported unemployment data for the two communities located within the regional study area differed greatly. Mecca's labor force reported a 27.1 percent rate of unemployment for May 2010 while the more affluent community of Thousand Palm's 2,500 labor force had a 9.8 percent rate of unemployment. However, in the absence of more specific information, the Riverside County unemployment rate was used to estimate the current unemployment for the unincorporated areas within Eastern Riverside County.

As discussed above, Twentynine Palms's unemployment rate was 17.1 percent in May 2010 and higher than the San Bernardino County's unemployment rate of 14 percent. In Arizona, the unemployment rate for La Paz County was 7.6 percent over the first four months of 2010. No 2010 sub-county area unemployment data is available. Generally, past unemployment rates for most of the communities within the regional study area have been lower than the County-wide average. However, in the absence of more current information, the La Paz County unemployment rate was used to estimate the current unemployment for the sub-county areas within the County.

The unemployment rate for the local study area is estimated to be 15.4 percent. Given the estimated local study area labor force estimate of 8,480, it is estimated that there are approximately 1,305 unemployed local study area residents. The unemployment rate for the regional study area is estimated to be 12.7 percent. Given the estimated local study area labor force estimate of 238,245, it is estimated that there are approximately 32,240 unemployed regional study area residents.

Labor Force Growth Projections

Table 3.14-6 presents County labor force estimates and projections for those skilled workers (by craft) required for construction and operation of the project as estimated by the Applicant. Employment figures for 2006 are provided, as well as employment projections for the selected occupations for 2016. The California Employment Development Department (EDD) groups Riverside and San Bernardino into one statistical area for data presentation purposes. As of 2006, there were relatively high numbers of skilled workers in Riverside and San Bernardino Counties, including metal workers (19,460), carpenters (28,850), and construction laborers (27,930).

Relevant specialized positions generally were fewer in number, including paving, surfacing, and tamping equipment operators, power plant operators, and construction trade helpers. Employment figures for all occupations presented are anticipated to either remain constant or increase by 2016. The two occupations with the largest anticipated future job growth by 2016 are construction laborers (4,150 new jobs) and carpenters (3,540 new jobs). The highest rate of job growth by occupation in Riverside and San Bernardino Counties is architects, surveyors, and cartographers (17.6 percent) (EDD, 2010).

TABLE 3.14-6
LOCAL LABOR POOL BY CRAFT – RIVERSIDE AND SAN BERNARDINO COUNTIES

	Annual Average Employment		Employment Change		Average Annual Job Openings		
Occupational Title	**2006**	**2016**	**Number**	**Percent**	**New Jobs**	**Net Replacements**	**Total**
Construction Managers	4,380	5,110	730	16.7%	135	160	295
Carpenters	28,850	32,390	3,540	12.3%	198	380	578
Cement Masons and Concrete Finishers	4,110	4,690	580	14.1%	38	120	158
Construction Laborers	27,930	32,080	4,150	14.9%	348	236	584
Paving, Surfacing, and Tamping Equipment Operators	630	720	90	14.3%	8	16	24
Operating Engineers and Other Construction Equipment Operators	4,790	5,460	670	14.0%	37	85	122
Electricians	6,740	7,600	860	12.8%	66	336	402
Plumbers, Pipefitters, and Steamfitters	4,630	5,330	700	15.1%	81	249	330
Metal Workers and Plastic Workers	19,460	20,800	1,340	6.9%	0	1024	1024
Helpers – Construction Trades	120	130	10	8.3%	35	169	204
Welders, Cutters, Solderers, and Brazers	3,960	4,640	680	17.2%	48	178	226
Architects, Surveyors, and Cartographers	1,420	1,670	250	17.6%	56	135	191
Engineering Managers	1,370	1,600	230	16.8%	43	170	213
Supervisors, Construction and Extraction Workers	10,990	12,380	1,390	12.6%	95	216	311
Machinists	2,630	2,960	330	12.5%	0	161	161
Total	**122,010**	**137,560**	**15,550**	**12.9%**	**1,188**	**3,635**	**4,823**

SOURCE: EDD, 2010.

No County-level employment projections for La Paz County are available. Given the small size of the available Arizona labor force within the regional study area, any future growth to the La Paz labor force would have a very minor change in future employment for construction occupations.

3.14.3 Fiscal Resources

A summary of Riverside County's expenses and revenues for the 2007-2008 fiscal year is provided in Table 3.14-7. As the proposed action would be constructed in Riverside County, the County would be the local agency with taxing power and could be expected to receive the majority of the direct impacts from the proposed project in the form of additional expenses or revenues (from business and sales taxes, permits, and other sources). The economic benefits of increased income and employment would result in indirect and induced revenue, and potential expenditures in Riverside and other surrounding counties (such as La Paz and San Bernardino Counties). However, impacts to the surrounding counties cannot be reasonably quantified as the actual distribution of economic benefits will largely depend on the origin of project's future construction worker population. It is difficult to predict the workers actual origin and consequently therefore corresponding local economy where they are likely to spending most of their earnings.

TABLE 3.14-7
RIVERSIDE COUNTY EXPENSES AND REVENUES FOR FY 2007-2008

	Amount (Dollars)	Percent
Expenses	$2,717,107,833	100%
General Government	$299,748,199	11.0%
Public Safety	$1,059,121,385	39.0%
Public Ways and Facilities	$146,363,144	5.4%
Health	$340,957,271	12.5%
Public Assistance	$760,500,349	28.0%
Education	$17,907,992	0.7%
Recreation & Cultural	$199,776	0.0%
Debt Services	$77,863,426	2.9%
Transfers Out	$14,446,291	0.5%
Revenue Sources	$2,999,779,907	100%
Special Benefit Assessment	--	--
Property Taxes	$541,147,001	18.0%
Other Taxes	$69,873,595	2.3%
Licenses, Permits, Franchises	$40,960,870	1.4%
Fines, Forfeitures and Penalties	$90,299,415	3.0%
From Use of Money and Property	$106,339,835	3.5%
From Other Governmental Agencies	$1,719,722,101	57.3%
Charges for Current Services	$400,693,092	13.4%
Miscellaneous Revenue	$23,922,463	0.8%
Other Financing Sources	$2,848,266	0.1%
Transfers In	$3,973,269	0.1%

SOURCE: State of California County Controller, 2009.

For the fiscal year 2007-2008, tax revenue for Riverside County totaled approximately $3.0 billion, and expenditures totaled $2.7 billion. Riverside's key expenditures were on public assistance, public safety, and health. The County acknowledges that the economic slowdown may result in revenues lower than past projections which may lead to cutbacks in services.

3.15 Soils Resources

The Project site is located in the Mojave Desert Geomorphic Province (NRCS, 2011). The Province is a broad interior region of isolated mountain ranges separated by expanses of desert plains and is characterized by interior enclosed drainages and many playas. The Project site lies near the toe of alluvial fans emanating from the Chuckwalla Mountains to the south, the Coxcomb Mountains to the north, and the Palen Mountains to the northeast. The elevation of Chuckwalla Valley ranges from under 400 feet at Ford Dry Lake to approximately 1,800 feet above mean sea level (amsl) west of Desert Center and along the upper portions of the alluvial fans that ring the valley flanks. The surrounding mountains rise to approximately 3,000 and 5,000 feet amsl.

The ground surface in the region of the Project site generally slopes gently downward to the southeast at a gradient of less than 1 percent. Ground surface elevations at the Project site itself range from approximately 680 feet amsl in the southwest to 425 feet amsl in the northeast. The existing topographic conditions of the site show an average slope of approximately one foot in 75 feet (1.33%) toward the northeast. Steeper grades are present at isolated sand dunes along the northern portion of the site. Toward the north and central portions of the site, the ground becomes hummocky as it transitions to playa.

The climate in the Chuckwalla Valley is arid and has low precipitation. The region experiences a wide range in temperature, with very hot summer months with an average maximum temperature of 108 degrees Fahrenheit (ºF) in July and cool dry winters with an average maximum temperature of 66.7 ºF in December (CEC RSA, 2010). The Blythe area receives approximately 3.5 inches of rainfall per year. The majority of the rainfall occurs during the winter months, but rainfall during the late summer is not uncommon. The summer rainfall events tend to be a result of tropical storms that have a short duration and a higher intensity than the winter rains. Annual average precipitation ranges from 0.02 to 0.47 inches per month (CEC RSA, 2010).

Prevailing winds in the vicinity of the project vary seasonally, and indicate two dominant wind directions during typical years. During the spring and summer months, the strongest winds are associated with monsoonal storm events, and come from the south. During the fall and winter months, the prevailing winds are associated with Pacific Ocean derived weather patterns, and come from the north-northwest.

3.15.1 Soil Characteristics

The Natural Resources Conservation Service (NRCS) is the leading resource for soil surveys that detail soil characteristics of an area. Soil units described by the NRCS are classified as a 2nd Order survey at a scale of 1:20,000 with delineations of 1.5 to 10 acres. Soil mapping at the Project site is currently underway by the NRCS but the publication date of survey results is unknown (CEC RSA, 2010). General soils data discussed here were derived from the United States General Soil Map (NRCS 2011; known as STATSGO2, updated in 2006) which is a 4th Order survey (5th Order being the least detailed – scale of 1:250,000 to 1: 1,000,000). The

STATSGO 2 data are not designed for use as a primary tool for permitting or citing decisions. They do serve as a general reference to general soil conditions.

The Regional Soil Map shows two soil map units on the Project site: 1) the Rositas–Dune land–Carsitas map unit and 2) the Vaiva-Quilotosa-Hyder-Cipriano-Cherioni map unit (Figure 3.15-1). The Rositas-Dune land-Carsitas map unit occurs on 54 percent of the site and is characterized by soils with a very high sand percentage (greater than 95 percent) and is highly susceptible to wind erosion. The remaining 46 percent of the site was mapped as the Vaiva-Quilotosa-Hyder-Cipriano-Cherioni map unit characterized by soils with high percentage (greater than 65 percent) of sand with moderate susceptibility to wind erosion. These data were used in conjunction with field observations and laboratory testing conducted as the result of field reconnaissance to better characterize the soils on site (CEC RSA, 2010).

Because the NRCS has not mapped soils at the site as part of the Riverside County soil survey, the Applicant commissioned a general survey to characterize the soil conditions at the Project site. CH2M HILL conducted a preliminary site reconnaissance at the Project site in 2008 and collected two soil samples. Based on the reconnaissance and the two samples collected, soils on site were described as consisting of sandy material and classified as poorly graded sand with silt. Across most of the project site, the soils would be expected to range from silty sand to poorly graded sand with silt. Typical fines content in these soils would be in the range of 5 to 35 percent (CEC RSA, 2010).

AECOM (CEC RSA, 2010) characterized soils on site in greater detail through field observations and laboratory testing. Laboratory textural analysis and field observations determined that the on-site soils were predominantly sands. Soil profiles observed in the test pits were typically sands and laboratory analysis measured sand content from 83 to 94 percent. Silt content measured in the soils ranged from 2 to 8 percent, and clay content from 2 to 11 percent. Observed profiles exhibited a range of effervescence from none to slight in the top layers, but effervescence increased with depth indicating increasing percentages of carbonates (CEC RSA, 2010).

The laboratory and field observations are not consistent with the descriptions of the Vaiva-Quilotosa-Hyder-Cipriano-Cherioni map unit from the General Soil Map. However, this is not unexpected, based on the relatively low resolution of STATSGO mapping data. The data from the current investigation are considered more accurate than the generalized soils map. Therefore, the Rositas-Dune land-Carsitas map unit is considered the representative soil type at the Project site (CEC RSA, 2010). Active sand dunes are located in the northern portion of the Project site (discussed in detail below).

Detailed soil descriptions come from the NRCS Official Series Descriptions (CEC RSA, 2010). Table 3.15-1 includes information about soil characteristics including depth, texture, drainage, permeability, and erosion hazard of individual soil mapping units. Land capability classification is an indicator of the soils' primary limitations for revegetation. Soils on the plant site include VIIe and VIIIc Capability Subclasses. These subclasses indicate that the soils are unsuitable for cultivation and production of commercial crops.

TABLE 3.15-1
SOIL SERIES AND THEIR DESCRIPTIONS

Soil Series Name	Description
Rositas	Rositas Series – Sandy Loam - Dunes and sand sheets - Very deep, well drained - Slopes range from 0 to 30 percent with hummocky or dune micro relief - Negligible to low runoff - Rapid permeability - High susceptibility of wind erosion - Capability Subclass VIIe nonirrigated - Taxonomic Class: Mixed, hyperthermic Typic Torripsamments (source: http://www2.ftw.nrcs.usda.gov/osd/dat/W/WASCO.html)
Carsitas	Carsitas Series – Gravelly Sand - Formed in alluvial fans, moderately steep valley fills and dissected remnants of alluvial fans - Excessively drained - Slopes range from nearly level to strongly sloping - Slow runoff except during rare torrential showers - Rapid permeability - High susceptibility of wind erosion - Capability Subclass VIIe nonirrigated - Taxonomic Class: Mixed, hyperthermic Typic Torripsamments http://www2.ftw.nrcs.usda.gov/osd/dat/C/CARSITAS.html
Dune land	Dune land – Sand - Dunes can be as much as 25 feet high but are generally 10 feet high - Very slow runoff - High hazard of wind erosion - None or slight hazard of water erosion

SOURCE: CEC RSA, 2010.

3.15.2 Sand Migration and Dunes

The project site is located within the Chuckwalla Valley, a region of active aeolian (wind-blown) sand migration and deposition. Active aeolian sand migration occurs in migration corridors in the northeastern section of the project site and to the northeast of the site. Aeolian processes play a major role in the creation and establishment of sand dune formations and habitat in the Chuckwalla Valley and those within the project area. (CEC RSA, 2010; PWA, 2010).The sand corridor stretches down the Chuckwalla Valley to Blythe and the Colorado River, however, the amount (if any) of Palen-Ford dunefield sand that reaches the Colorado River is unknown at present. At a macroscale, the site is part of the Clark’s Pass sand ramp running from NW to SE from the Dale Lake playa in the southern Mojave Desert north of Joshua Tree National Park (San Bernardino County) to sediment sinks in the Palen-Ford dune field in Sonoran Desert of Riverside County (Zimbelman et al., 1995). Winds enable the sand ramp to surmount topographic barriers that otherwise separate the Dale Lake Basin and the Palen-Ford Basin. The proposed project area covers several different land units (Figure 3.15-2) including (from southwest to northeast) a currently stable coarse gravel alluvial fan surface with some relict sand dunes that have largely deflated (blown away), a more active wind-blown sand area with relatively shallow sand deposits, and an area of deeper and more active vegetated sand dunes that is Mojave Fringe Toed Lizard (MFTL) habitat (discussed in detail in Section 3.23, *Wildlife Resources*; see also, PWA, 2010). In the southern and western sectors of the Project site, the surface is a mixture of deflated vegetated dunes with thin coarse sand and patches of alluvial gravel and desert varnish with little available fine loose sand for transport to dunes downwind (PWA, 2010). Moving north and east the fan surface has sandier conditions and transitions from creosote (*Larrea tridentata*) shrub to grasses. This area has shallow vegetated sand dunes and sand sheets that are less deflated and that have more abundant sand than the dunes in the mid fan. The dunes appear to be in relative equilibrium; losses of sand due to wind erosion are matched by deposition of sand from upwind. There is evidence of moderate levels of wind-borne sand transport, and this surface appears to form the outer zone of the sand transport corridor (PWA, 2010). Moving north and east, the vegetated dunes become deeper and the sand becomes more abundant. This area has hummocky vegetated dunes with greater topographic expression than the zone to the west, implying that they are more actively supplied by sand. This area is characterized as MFTL sand dune habitat and this portion of the sand transport corridor is more active than the shallow vegetated sand dunes (PWA, 2010).

The dominant sand migration direction within the corridors is toward the east and south (CEC RSA, 2010). Sand delivered from upwind is deposited, replenishing sand that has been lost downwind. Regional aeolian system studies indicate that the prevailing wind responsible for aeolian sand transport was from the northwest toward the southeast and locally controlled by topography (mountain ranges; CEC RSA, 2010). Three aeolian sand migration corridors occur in the Chuckwalla Valley region: the Dale Lake-Palen Dry Lake-Ford Dry Lake sand migration corridor along the Chuckwalla Valley; the Palen Valley-Palen Dry Lake sand migration corridor where sand is transported southeast along the Palen Valley; and the Palen Pass-Palen-McCoy Valley sand migration corridor, located between the Palen and McCoy Mountains, where sand is transported in a southerly direction/towards the Chuckwalla Valley (CEC RSA, 2010). These sand migrations appear to be driven primarily by winter/Pacific ocean oriented winds, which generally blow from the north-northwest. The proposed project lies within the Palen-Ford sand migration corridor. Nearly half of the project disturbance area (1,735 acres; CEC RSA, 2010) would be located in stabilized and partially stabilized sand dunes, wash habitat, and other areas with soils characteristic of active aeolian sand migration and deposition. Additional sand is added to corridors from local wind corridors that can be thought of as ‘sand corridor tributaries’ and by fluvial sources. The activity and location of sand transport corridors are not fixed in time or space. Sand corridors can expand, contract or migrate with changing weather and climate (PWA, 2010). The sand migration corridor where the project is sited can be further divided into discrete zones that characterize differing rates of sand transport, for correlation to MFTL habitat sensitivity (PWA, 2010). The sand migration corridor near the project site has been divided into four zones for describing the sand migration process at and proximate to the Project (Figure 3.15-3). Zone 1 has the greatest rate of sand transport and Zone 3 the lowest rate. Zone 4 is designated to the south of the borders of Zones 2 and 3, and represents an area where wind transport is not a significant process for sand migration (and subsequently is estimated to have low sensitivity and value as MFTL habitat). The greatest abundance of MFTL has been observed in Zone 2 (discussed in detail in Section 3.23, *Wildlife Resources*) due to the combination of active wind transport and vegetation cover, with fewer MFTL in Zones 1 (abundant sand but little vegetation) and 3 (plentiful vegetation but less active sand transport). Therefore, Zone 2 represents the most sensitive zone within the sand migration corridor proximate to the Project site (PWA, 2010).

3.16 Special Designations

Two systems of federally managed lands are in the vicinity of project. In December 2008, the Secretary of the Interior signed a Secretarial Order to officially designate the 258 million acres of lands managed for multiple-use by the BLM as the *National System of Public Lands*. The project site and the vast majority of the federally-administered public lands in the vicinity of the site are managed as part of this system. The second system of federally managed lands is the *National Park System*. Joshua Tree National Park, a National Park Service (NPS)-managed component of this system, is located approximately 8.5 miles from the project site and would be within the viewshed of the project. Specially-designated BLM-administered public lands and the NPS-administered Joshua Tree National Park are shown on Figure 3.16-1. The visibility of the project from specially-designated areas is discussed in Chapter 3.19, *Visual Resources*.

3.16.1 National System of Public Lands

Special designations on public lands are established through the BLM's land use planning process, Congressional legislation, or Executive Orders and include, but are not limited to, National Monuments, National Conservation Areas (NCAs), Wilderness, National Scenic or Historic Trails, Wild and Scenic Rivers, Cooperative Management and Protection Areas, Outstanding Natural Areas, National Recreation Areas, Forest Reserves, and Areas of Critical Environmental Concern. These designations also may be part of the BLM's National Landscape Conservation System (NLCS) as described in Public Law 111-11 Sec. 2002(b). There are four designated wilderness areas within approximately 20 miles of the project site (see below). The Omnibus Public Land Management Act of 2009 specified that the public lands within the California Desert Conservation Area administered by the BLM for conservation purposes would be included in the NLCS. There are no National Monuments, National Scenic or Historic Trails, Wild and Scenic Rivers, Cooperative Management and Protection Areas, Outstanding Natural Areas, National Recreation Areas, or Forest Reserves within 20 miles of the project site.

Other special designations are defined in FLPMA or have been established through the BLM's land use planning process. Such designations include wilderness study areas (WSAs), Areas of Critical Environmental Concern (ACECs), Scenic or Back Country Byways, watchable wildlife viewing sites, wild horse and burro ranges, and other special designations identified in BLM Handbook H-1601 – Land Use Planning Handbook, Appendix C, III, *Special Designations*. There are five ACECs and one Back Country Byway within about 20 miles of the project site. Although the project site includes acreage that formerly was included in a wilderness study area, the designation was released decades ago. There are no WSAs, Scenic Byways, designated watchable wildlife viewing sites, or wild horse and burro ranges in the vicinity of the site.

Designated Wilderness Areas (WAs)

Wilderness areas are congressionally designated and are managed pursuant to the federal Wilderness Act of 1964 (16 USC 1131–1136) and the specific legislation establishing the wilderness. The Department of Interior agencies are authorized to manage wilderness areas for the public's use and enjoyment in a manner that will leave such areas unimpaired for future use and enjoyment as "wilderness" by providing for their protection and the preservation of their wilderness character, and by gathering and disseminating information about their use and enjoyment. The Wilderness Act (16 USC Sec 1131-1136) defines "wilderness" as an "area where the earth and its community of life are untrammeled by man." A designated wilderness area is defined as having four primary characteristics, including the following:

1. a natural and undisturbed landscape;
2. outstanding opportunities for solitude and unconfined recreation;
3. at least 5,000 contiguous acres; and
4. feature(s) of scientific, educational, scenic, and/or historic value

Four designated wilderness areas are located in the vicinity of the project site and were established by the California Desert Protection Act of 1994 (CDPA) (16 USC Sec 410aaa. *et seq*.). Managed by the BLM, the Palen/McCoy Wilderness is approximately two miles northeast, the Chuckwalla Mountains Wilderness is approximately 1.5 miles south and the Little Chuckwalla Mountains Wilderness is approximately 16 miles southeast. Managed by the National Park Service (NPS), the Joshua Tree Wilderness is approximately 8.5 miles northwest of the project site (see Section 3.16.2, *National Park System* for further discussion).

Palen/McCoy Wilderness

The Palen/McCoy Wilderness encompasses approximately 236,488 acres. Within it are the Granite, McCoy, Palen, Little Maria, and Arica Mountains, which are five distinct mountain ranges separated by broad sloping bajadas. Because this large area incorporates so many major geological features, the diversity of vegetation and landforms is exceptional. The desert wash woodland found here provides food and cover for burro deer, coyote, bobcat, gray fox, and mountain lion. Desert pavement, bajadas, interior valleys, canyons, dense ironwood forests, and rugged peaks form a constantly changing landscape pattern. State Highway 62 near the Riverside County line provides access from the north, and Interstate 10 via the Midland Road near Blythe provides access from the south. The area is accessible by four-wheel drive vehicles only. Mechanized or motorized vehicles are not permitted in a wilderness (CEC RSA, 2010).

Chuckwalla Mountains Wilderness

The Chuckwalla Mountains Wilderness is approximately 99,548 acres and lies south of I-10. Within the area is the Chuckwalla Mountains. Included within the walls of this rock fortress are a variety of landforms, textures, and colors. Steep-walled canyons, inland valleys, large and small washes, isolated rock outcrops and vast desert expanses interact to form a constantly changing panorama. The plant and wildlife species are as uniquely diverse. Bighorn sheep, burro deer, raptors, snakes, coyotes and fox inhabit the area. The southwestern bajada region has been identified as highly crucial habitat for the desert tortoise. Ocotillo, cholla, yucca, creosote and barrel and foxtail cactus cover the landscape and provide seclusion. Hunting, fishing, and non-commercial trapping are allowed. Pets are allowed. Horses are permitted. Camping is permitted, limited to 14 days. Access to the wilderness is from the north via I-10. Eastern access via Corn Springs and Du Pont Roads is provided by the Corn Springs exit on I-10. The Red Cloud Road exit from I-10 provides access from the west, and the Bradshaw Trail provides access to the wilderness from the south. Mechanized or motorized vehicles are not permitted in a wilderness (CEC RSA, 2010).

Little Chuckwalla Wilderness

The Little Chuckwalla Wilderness is 28,034 acres and also lies south of I-10. It includes rugged mountains surrounded by a large, gently sloping bajada laced with a network of washes. To the north, a bajada gently rises to 400 feet, while the rugged mountains crest at 2,100 feet. Habitat for bighorn sheep and desert tortoise can be found in portions of this region, and the southern bajada has been identified as crucial desert tortoise habitat. Several sensitive plant species grow here, including the California snakeweed, Alverson's foxtail cactus, and the barrel cactus. Interstate 10 provides northern access to the Little Chuckwallas via the Ford Dry Lake exit; Graham Pass Road from the west; and Teague Well four-wheel drive route from the east. Both routes access the Bradshaw Trail to the south, which connects to Wileys Well Road.

Users of these wilderness areas, including the Joshua Tree Wilderness Area, discussed below, are seeking opportunities to experience nature, solitude, and unconfined recreation. The areas have no developments other than sparse trails and routes that have not been reclaimed since the wilderness designation. Little data exist on the amounts, types, and trends of visitor use experiences such as camping, hiking, or site seeing. Recreation uses are discussed in Section 3.13, *Recreation*, and include hunting, fishing, and non-commercial trapping. Pets are allowed. Horses are permitted. Camping is permitted, but is limited to 14 days. After 14 days, campers must relocate at least 25 miles from the previous site.

Motorized-vehicle access is prohibited in wilderness areas except under certain circumstances (i.e., where access is required to private property, to facilitate activities associated with valid mining claims or other valid occupancies, to fulfill fish and wildlife management responsibilities under jurisdiction of the California Department of Fish and Game or the U.S. Fish and Wildlife Service, or to accomplish certain administrative and law enforcement operations, including fire suppression and search and rescue operations). Opportunities for the general public to stop, park, or base camp with vehicles inside wilderness are not available.

Wilderness Study Areas (WSAs)

The BLM, through Section 603(a) of FLPMA or established by statute, manages 80 WSAs in California, totaling over 1,360,000 acres. Such areas are roadless, generally at least 5,000 acres, and consist of islands of public lands that have the wilderness characteristics described above. BLM is required to manage WSAs so as not to impair their suitability as wilderness until Congress decides whether it either should be designated as wilderness or should be released for other purposes.

The closest existing wilderness study areas to the site are the Beauty Mountain Wilderness Study Area, approximately 30 miles west of the city of Temecula in San Diego County, and the Cady Mountain Wilderness Study Area between Barstow and Baker along I-40 in San Bernardino County (CEC RSA, 2010). Both wilderness study areas are approximately 100 miles from the project site.

Lands with Wilderness Characteristics

Lands outside of designated wilderness or WSAs are assessed during the RMP or amendment process to determine if they possess one or more wilderness characteristics. Also, plan decisions can include a land use allocation requiring these lands to be managed as Wild Lands to protect one or more wilderness characteristics during the life of the plan (see BLM Land Use Planning Handbook, H-1601-1, Appendix C, (K) Wilderness Characteristics, BLM IM No. 2011-034, and Secretarial Order 3310). These characteristics include naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation.

The proposed LUP amendment for the PSPP includes public lands that were inventoried for potential wilderness designation between 1976 and 1979. All Public Lands within the CDD were analyzed and summarized in 1979 wilderness inventory decisions performed pursuant to the FLPMA. See “California Desert Conservation Area – Wilderness Inventory – Final Descriptive – March 31, 1979”. Public Land within the project site is contained within CDCA Wilderness Inventory Units (WIU) #CDCA 325, 330, and 331. No part of the project site would be on public lands identified as having wilderness characteristics in that 1979 decision.

WIU #CDCA 325 encompassed a large area. The boundary was generally tied on the west to Highway 177; on the north to Highway 62 and an aqueduct; and on the east to Midland-Rice Road. The 1979 decision established the Palen/McCoy WSA for the Public Lands determined to have wilderness characteristics. Public lands not included in the WSA, including those lands now being analyzed for the project, were those where the imprints of man were substantially noticeable. These included impacts from mining, extensive networks of vehicle ways on some bajadas, and sites used by the U.S. Army for desert tank training during WWII. The California Desert Protection Act (CDPA) of 1994 designated the Palen/McCoy Wilderness. The boundary for the wilderness was similar to the boundary of the WSA.

WIU #CDCA 330 was a narrow, elongated area bordered by a pole line access road to the north and by Interstate 10 to the south. This relatively flat, linear area has little topographic relief and ranges from sparsely vegetated creosote to nearly nonexistent vegetation on Ford Dry Lake. The area has been disturbed by man. Fence enclosures are located throughout the area, along with past evidence of development and two wells. With an average width of one to two miles, the confining nature of the unit severely restricts opportunities for solitude or a primitive and unconfined type of recreation. As such, the 1979 decision was that no portion of this unit had wilderness characteristics and no public lands were identified as a WSA.

WIU #CDCA 331 was bordered on the northeast by a maintained road; on the south, by Interstate 10; and, on the northwest, by Highway 177. This area is relatively flat and includes creosote and some ironwood vegetation. Much of the western portion is in private land ownership. Man's work is substantially noticeable within this area, especially on the large portion of privately-owned lands which includes buildings, roads, and an airport. Opportunities for solitude or a primitive and unconfined type of recreation are limited due to the confining nature of the area and inability of topographic features to screen visitors from one another. As such, the

1979 decision was that no portion of this unit had wilderness characteristics and no public lands were identified as a WSA.

Relevant portions of the Wilderness Inventories for the three WIUs were maintained pursuant to section 201(a) of the FLPMA. The current conditions existing in 2011 are essentially the same as in 1979. In summary, no changes have occurred since 1979 that would result in findings that differ from the 1979 decision that wilderness characteristics were not present in the project area. Therefore, wilderness characteristics were not analyzed further in this EIS.

Areas of Critical Environmental Concern (ACECs)

ACECs are BLM-specific, administratively-designated areas within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural systems or processes; or to protect life and safety from natural hazards (FLPMA, 43 USC 1702(a); 43 CFR 1601.0-5(a)). By itself, the designation does not automatically prohibit or restrict uses in the area; instead, it provides a record of significant values that must be accommodated when BLM considers future management actions and land use proposals.

There are six ACECs located in the vicinity of the site. Chuckwalla Desert Wildlife Management Area (DWMA) ACEC is approximately 0.25 mile southwest and is 352,633 acres. The NECO Plan designates this DWMA as an area of “critical environmental concern” to protect desert tortoise and other significant natural resources including special status plant and animal species and natural communities. The Palen Dry Lake ACEC is located approximately 0.5 mile northeast of the project site; it was established to protect cultural resources. The Corn Springs ACEC is approximately 2,467 acres and is approximately 5.5 miles southwest of the site. This ACEC boundary includes land suitable for wilderness designation by Congress. Alligator Rock ACEC consists of 7,754 acres. It is located six miles west of the site and also was established based on the suitability of the acreage for wilderness designation. The Desert Lily Preserve ACEC is six miles northwest of the site and is designated to protect sensitive natural, scenic, ecological, and cultural resource values of its 2,055 acres. The 2,273-acre Chuckwalla Valley Dune Thicket ACEC is located approximately 17 miles southeast of the site. This ACEC is managed for wildlife habitat, specifically that of the desert tortoise. Recreation uses allowed in ACECs are discussed in Section 3.13, *Recreation*.

Back Country Byway

The Bradshaw Trail is a 65-mile National Back Country Byway located about 17 miles south of the project site that extends from about 35 miles southeast of Indio to about 15 miles southwest of the City of Blythe. It was the first road through Riverside County, blazed by William Bradshaw in 1862 as an overland stage route beginning in San Bernardino, California, and ending at Ehrenberg, Arizona. The trail was used extensively between 1862 and 1877 to transport miners and passengers. The trail is a graded dirt road that traverses mostly public land between the Chuckwalla Mountains and the Chocolate Mountain Aerial Gunnery Range. Recreational opportunities include four-wheel driving, wildlife viewing, plant viewing, birdwatching, scenic drives, rockhounding, and hiking.

3.16.2 National Park System

Like the BLM, the NPS is a bureau of the U.S. Department of the Interior. Since 1916, the NPS has been entrusted with the care of America's national park system, which now numbers nearly 400 places that collectively are visited by more than 275 million people each year (NPS, 2010). One unit of the National Park System is located approximately 8.5 miles from the project site: Joshua Tree National Park.

President Franklin D. Roosevelt proclaimed Joshua Tree a National Monument on August 10, 1936, to protect various objects of historical and scientific interest (Proclamation 2193, 50 Stat. 1760). Congress re-designated a National Park on October 31, 1994, as part of the California Desert Lands Protection Act of 1994 (16 U.S.C. § 410aaa et seq.). In establishing this National Park, Congress found that the desert lands within it constitute a "public wildland resource of extraordinary and inestimable value for current and future generations," that has "unique scenic, historical, archeological, environmental, ecological, wildlife, cultural, scientific, educational and recreational values." Joshua Tree also is recognized by the United Nations Educational, Scientific, and Cultural Organization under its Man and the Biosphere Program as a Biosphere Reserve.

As of September 23, 2000, the Joshua Tree National Park consisted of approximately 1,017,748 acres. It lies 140 miles east of Los Angeles, 175 miles northeast of San Diego, and 215 miles southwest of Las Vegas. One of three park entrance locations is at Cottonwood Spring, which lies 25 miles east of Indio and near the project site. Joshua Tree National Park is open year-round, although the peak time for visitors is April. The total number of visitors to the Park increased by 240 percent between 1986 (525,000 visitors) and 1997 (1,200,000) (NPS, 1998). Visitorship remains over a million people per year (Uhler, 2007).

Joshua Tree Wilderness

The Joshua Tree Wilderness is approximately 594,502 acres and is managed by the National Park Service as part of Joshua Tree National Park. The Joshua Tree Wilderness is bordered by the Sheephole Valley Wilderness to the north and the Pinto Mountains Wilderness to the north. It is approximately 10 miles north of I-10 and abuts State Highway 177 to the west. The lower, drier Colorado Desert dominates the eastern half of the wilderness, home to abundant creosote bushes, ocotillo, and the cholla cactus. The slightly more cool and moist Mojave Desert covers the western half of the wilderness, serving as a breeding ground for the Joshua trees. Five fan-palm oases are located in this wilderness area, where surface or near-surface water gives life to palms trees. A diverse variety of desert wildlife species, such as Bighorn sheep, eagles, and kangaroo rats occupy this wilderness. The steep elevations provide views to the south and east which overlook the project. Aerial photography shows no trails or other established routes within this Wilderness segment.

3.17 Transportation and Public Access – Off Highway Vehicle Resources

3.17.1 Public Access

Introduction

Recreation and motorized travel opportunities are determined, in part, by California Desert Conservation Area Plan (CDCA) Multiple Use Class and off-road area designations. The multiple use class is based on the sensitivity of resources and kinds of uses appropriate in various geographic areas. Each of the four multiple-use classes describes a different type and level or degree of use permitted within specified areas. The BLM also designates the public lands it administers as open, limited, or closed to off-road vehicles pursuant to Executive Order 11644 (1972), *Use of Off-Road Vehicles on the Public Lands*, as amended in 1974 by Executive Order 11989; and other authorities, including the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.), BLM planning regulations (43 CFR Part 1600), and BLM Land Use Planning Handbook H-1601-1. For the purpose of this section, the terms Off-Road Vehicle and Off Highway Vehicle (OHV) are used interchangeably, although OHV is the term most used by the BLM and in other federal land use planning efforts.

Multiple Use Class

With the exception of a privately-owned 40-acre parcel, the proposed action would be developed entirely within Multiple Use Class M-Moderate Use. This class is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such a mining, livestock grazing, recreation, energy, and utility development. See Section 3.9, *Multiple Use Classes*, for more information about the land use and resource-management guidelines applicable to MU-M areas.

OHV Routes

In establishing the CDCA, Congress declared that “the use of all California desert resources can and should be provided for in a multiple use and sustained yield management plan to conserve these resources for future generations, and to provide present and future use and enjoyment, particularly outdoor recreation uses, including the use, where appropriate, of off-road recreational vehicles.” 43 USC 1781(a)(4).

The CDCA Plan and NECO Plan Amendment state that vehicle access is among the most important recreation issues in the desert. A primary consideration of the recreation program is to ensure that access routes necessary for recreation enjoyment are provided (BLM, 2001 Section 3.8.2). For purposes of OHV management, vehicle access in MUC-M areas is directed toward use of approved (“open” or “limited”) routes of travel, or “open washes.”

Under the CDCA Plan, as amended, BLM-administered public lands within the CDCA are designated as *Open, Limited* or *Closed.* Within open areas, motorized vehicles may travel anywhere; in closed areas, such travel is prohibited. There are no BLM-designated open OHV areas in Riverside County. In limited areas, motorized-vehicle access is allowed only on certain *routes of travel*, defined to include roads, ways, trails, and washes.

In addition to OHV areas being designated as open, closed, or limited, OHV routes also are designated as *open*, *closed*, or *limited*, with the following definitions:

1. *Open Route:* Access by all types of motorized vehicles is allowed generally without restriction.
2. *Limited Route:* Access by motorized vehicles is allowed, subject to limitations on the number and types of vehicles allowed and restrictions on time or season and speed limits.
3. *Closed Route:* Access by motorized vehicles is prohibited except for certain official, emergency or otherwise authorized vehicles.

As required by the CDCA Plan, the NECO Plan amendment created a detailed inventory of existing routes within the NECO Plan area that were officially designated as *Open, Limited* or *Closed* as part of the NECO routes of travel system. The BLM's Palm Springs-South Coast Field Office (PSSCFO) currently is implementing route signing on the ground. A route has high significance if it provides access to other routes, historical sites, or recreational areas such as the back county driving, photography, camping, rock hounding and hiking opportunities in eastern Riverside County.

The project site has approximately 9 miles of designated open routes. OHV recreational opportunities on the site are limited to driving or riding on these routes. Routes of travel, other than washes, are shown in Figure 3.17-1.

The BLM has no traffic counters or other means to determine accurate use of routes in the vicinity of the project site. Observations by BLM staff and Law Enforcement Rangers report that use is relatively low on routes within the vicinity of the project site, not exceeding 300 visits per year. Recreation and vehicle use generally is limited to the cooler months of September through May. Use is nearly non-existent during the summer. Recreational vehicle use consists of touring in passenger cars, SUVs, motorcycles, and ATVs.

Washes Open Zones

The CDCA Plan, as refined in the NECO Plan, provides special management considerations for OHV use on washes, sand dunes and dry lakes. As part of the land use planning process, MUC designations were assigned to regions throughout the CDCA Plan area. As stated in the NECO Plan, "all navigable washes not individually inventoried and mapped on public lands would be designated as open routes as a class except where such washes occur within a washes closed zone" (p. 2-77). Since there are no OHV *Open Area* designations within the PSSCFO area, motorized travel available to the public in the NECO Plan area is restricted to authorized routes of travel with the exception of washes open zones (BLM CDD, 2002).

The project site is in a "washes open zone." Under the NECO Plan, all MUC-M areas are considered "washes open zones" unless specifically designated limited or closed. The use of washes within "washes open zones" is restricted to those considered "navigable," unless it is determined that vehicle use must be further limited. Navigable washes in "washes open zones" are designated "open" *as a class*, that is, washes are not individually designated unless they are identified as specific routes in the NECO route inventory. In this context, the term "wash" is defined as a watercourse, either dry or with running or standing water, which by its physical nature, width, soil, slope, topography, vegetative cover, etc. permits the passage of motorized vehicles, thereby establishing its "navigability" (BLM, 1980; BLM CDD, 2002 Section 3.9.5).

There are approximately 100 minor dry washes that cross the site from southwest to northeast, draining the area downstream of I-10 towards Palen Dry Lake. There are two more significant ephemeral wash complexes that cross the site from southwest to northeast, draining the area downstream of I-10 towards Palen Dry Lake. The BLM has not inventoried or analyzed specific washes in the project area as to their navigability, but by the above definition, all or portions of these washes may be considered navigable through a portion of the project site. As is the case with designated routes, the BLM has no means to determine accurate use of "open wash zones" in the vicinity of the project site.

3.17.2 Transportation

Major Traffic Routes within the Vicinity of the Project

U.S. Interstate 10

Interstate 10 is an east-west regional arterial that crosses much of the southern United States. It runs from the Los Angeles area east to Phoenix, Arizona, where it turns south and continues to Tucson, Arizona, ultimately continuing east to Jacksonville, Florida. In the project area, the speed limit is 70 miles per hour and the road is fully improved to freeway status with two lanes in each direction, each direction experiencing an Average Annual Daily Traffic (AADT) volume of 21,400 vehicles in 2008 (the most recent year for which Caltrans figures are available). There are no bicycle or pedestrian facilities located on I-10 near the project site; however, bicycles are allowed on I-10 from Dillon Road, Coachella (west of the project site) to Mesa Drive, Blythe (east of the project site). The State Department of Transportation (Caltrans) allows bicycle use on State highways where no alternative route is available.

Corn Springs Road

Corn Springs Road is an exit off of I-10 accessed by a diamond-configured interchange. The interchange includes single-lane ramps with ramp junctures, where stop signs control traffic from I-10 before it enters Corn Springs Road. Corn Springs Road is a relatively short road that runs north toward the project site, as well as south, where it intersects with Chuckwalla Valley Road. Corn Springs Road has curb and gutter, but no bicycle or pedestrian facilities.

Chuckwalla Valley Road

Chuckwalla Valley Road is a minor local access road running in an east-west direction just south of I-10 in the vicinity of the project site. It is a two-lane frontage road extending from the southern part of the Corn Springs Road interchange to the Ford Dry Lake Road interchange approximately 10 miles to the east. Stop signs on the Chuckwalla Valley Road approaches control the Corn Springs Road/Chuckwalla Valley Road intersection. Chuckwalla Valley Road has curb and gutter, but no bicycle or pedestrian facilities.

Existing Traffic Volumes

The level of service (LOS) is defined as 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. LOS indicators for the highway and roadway system are based on specific characteristics of traffic flow on designated sections of roadway during a typical day. For mainline freeway and road segments, these include overall traffic volume, speed, and density.

Several physical and operational characteristics of the roadway, such as lane configuration, flow speed (typical speed between intersections), and number of intersections per mile, are used to determine the vehicular capacity of the roadway segment. When these two sets of data are compared, a volume-to-capacity ratio is calculated. These factors are then converted to a letter grade identifying operating conditions and expressed as LOS A through F. The *Highway Capacity Manual 2000*[1], published by the Transportation Research Board, Committee on Highway Capacity and Quality of Service, includes six levels of service for roadways or intersections ranging from LOS A (best operating conditions characterized by free-flow traffic, low volumes, and little or no restrictions on maneuverability)—the best operating conditions—to LOS F (forced traffic flow with high traffic densities, slow travel speeds, and often stop-and-go conditions)—the worst.

Table 3.17-1 provides existing traffic volumes and LOS for I-10 that likely would be used for indirect access to the project site. As indicated below, I-10 and Corn Springs Road are classified as LOS A in the project area.

Site Access

Site access would be via a new 24-foot wide paved access road, 1,350 feet long, starting at the existing Corn Springs Road at the I-10 interchange. No improvements to I-10 would be needed. Corn Springs Road currently runs north-south across I-10 and terminates just north of the I-10 overpass. From this dead-end, Corn Springs Road would be extended east to connect with a new access road into the site.

1 This manual is a common guide used for computing the capacity and quality of service of various highway facilities, including highways, arterial roads, signalized and unsignalized intersections and the effects of mass transit, pedestrians, and bicycles on the performance of these systems.

TABLE 3.17-1
EXISTING TRAFFIC VOLUMES AND LEVEL OF SERVICE

	Existing Conditions			
Roadway/Segment	**Travel Lanes**	**Volume**	**Capacity**	**LOS**
I-10 West of Project Site	4	3,145	8,000	A
I-10 East of Project Site	4	3,145	8,000	A
Corn Springs Road	2	Negligible		A

NOTES: Capacity represents approximate two-way capacity in vehicles per hour.
Volume represents the number of vehicles crossing a section of road per unit time at any selected period.

SOURCE: CEC RSA, 2010

Public Transportation in the Vicinity of the Project

Public transportation consists of rail and bus service, bicycle and pedestrian facilities, and airports. Information about these forms of public transportation follows.

Rail Service

The Arizona & California Railroad Company, which previously provided rail service in the vicinity of the site, filed a petition to abandon service with the Surface Transportation Board on March 12, 2009. The Surface Transportation Board is a federal economic regulatory agency charged with resolving railroad rate and service disputes and reviewing proposed rail mergers, rail line purchases, construction and abandonment. On January 13, 2010, the Surface Transportation Board ruled that the Arizona & California Railroad Company could abandon service in San Bernardino County and Riverside County. Consequently, no rail service is available near the site at this time.

In addition, no regional passenger railroad transportation exists in the immediate area. The nearest rail passenger service is at Amtrak Stations in Palm Springs, California and Yuma, Arizona.

Bus Service

There is no bus service to the site. Local bus service near the project site is limited to Route 3 of the Desert Roadrunner/Palo Verde Valley Transit Agency bus service, which provides express service on weekday peak hours from Blythe to multiple California State prisons located along I-10, including the Ironwood/Chuckwalla Valley State Prison complex located approximately 21 miles east of the project site. Other regional bus service is provided in the Coachella Valley by SunLine Transit Agency, whose bus system extends from Desert Hot Springs to Mecca (SunBus, 2010). Amtrak Thruway Bus Route 19b is an Indio-Bakersfield route that connects to Amtrak's larger system in Bakersfield. Greyhound routes include I-10 with a bus station in Indio.

Bicycle and Pedestrian Facilities

Bicycle and pedestrian activity in the vicinity of the project site is minimal-to-none. Development is extremely low-density and spread over a large area, which is not conducive to biking or walking.

Airports

The closest airfield to the project site is the privately-operated Desert Center Airport, located at the end of an unnamed road approximately 5 miles northwest of the main project site, but only about 2 miles (approximately 10, 500 feet) from the proposed gen-tie line. (As indicated in Table 2-1, *General Project Dimensions*, the proposed gen-tie transmission towers would range in height between 90 and 145 feet). The airport's runway is approximately 4,200 feet long. Chuckwalla Valley Associates, LLC, operates the airport to serve the Chuckwalla Valley Raceway. Airport use is light: about 150 aircraft operations per year at the airfield for the 12-month period ending December 31, 2006. See Section 3.12, *Public Health and Safety*, for more information about this airport.

Regarding new construction near airports, the Federal Aviation Administration (FAA) standards (14 CFR Part 77) require FAA notification if, as a result of construction, any criterion is met among those listed in Part 77.13 of Title 14 of Code of Federal Regulations. Notification is required, for example, if a proposed structure or object would be taller than 200 feet above the ground level at its site, or if it is taller than an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of an airport that has at least one runway more than 3,200 feet long.

3.18 Vegetation Resources

In addition to the analysis contained with the BLM's DEIS, this section is based on, and draws heavily from, the California Energy Commission's Staff Assessment (SA), Revised Staff Assessment (RSA) and Commission Decision for the PSPP. The project would be located in the Chuckwalla Valley between the Chuckwalla and Palen mountains in eastern Riverside County, and less than two miles from the southern edge of Palen Dry Lake (DTPC 2006 as cited in the CEC RSA, 2010). The Biological Resources Study Area (Study Area) consists of a 14,771 acre area that encompasses the approximately 4,024-acre Project Disturbance Area (including the transmission disturbance area) and a surrounding buffer area (Commission Decision, 2010).

The project site is located in the central portion of Chuckwalla Valley, an area east of Palm Springs in the Colorado Desert, a subsection of the Sonoran Desert. The elevation range of the Chuckwalla Valley is from 400 feet above mean sea level at Ford Dry Lake to approximately 1,800 feet above mean sea level along some of the bajadas that occur west of Desert Center, California, with the surrounding mountains rising to over 3,000 feet above mean sea level (Solar Millennium 2009a as cited in the CEC RSA, 2010). Hydrologically, the Study Area occurs in the Colorado River Basin within the Chuckwalla Valley Drainage Basin. This is an internally drained basin and all surface water flows to Palen Dry Lake in the western portion of Chuckwalla Valley and Ford Dry Lake in the eastern section of Chuckwalla Valley.

The unique position of the region at the junction with the Neotropic ecozone to the south contributes to the presence of a number of rare and endemic plants and vegetation communities specially adapted to this bi-modal rainfall pattern, and not found elsewhere in California. These include microphyll woodlands, palm oases, and a number of summer annuals that only germinate after a significant warm summer rain (CEC RSA, 2010).

This distinctive bi-modal climate of the Sonoran Desert distinguishes it, floristically, from other deserts, including the Mojave Desert, and from the rest of California, where warm dry summers and a single rainy season in winter are characteristic. In addition to being hotter and drier, the Sonoran Desert region also rarely experiences frost. Although the region supports numerous perennial species, including a wide variety of cacti, more than half of the region's plant species are herbaceous annuals, which appear only during periods of suitable precipitation and temperature conditions.

The Chuckwalla Valley is a region of active aeolian (wind-blown) sand migration and deposition but at a magnitude substantially less that it had experienced during dune aggradational events since the late Pleistocene (CEC RSA, 2010). Nevertheless, aeolian processes play a major role in the creation and establishment of sand dune habitat in Chuckwalla Valley and within the project area, habitat that is essential to the existence of the Mojave fringe-toed lizard among many other dune habitat specialists (especially beetles). In general, major local sand migration corridors used in the past currently are continue to be used, but the corridors have decreased in width since the late Pleistocene within the project area indicating that the aerial extent of aeolian activity in recent times is less that it once was during regional dune aggradational events (Solar Millennium 2010b as cited in the CEC RSA, 2010).

The dominant sand migration direction within the corridors is toward the east and south. Regional aeolian system studies indicate that the prevailing wind responsible for aeolian sand transport was from the northwest toward the southeast and locally controlled by topography (mountain ranges). Three aeolian sand migration corridors have been identified within the Chuckwalla Valley region including the following: The Dale Lake–Palen Dry Lake–Ford Dry Lake sand migration corridor; the Palen Valley–Palen Dry Lake sand migration corridor; and the Palen Pass–Palen-McCoy Valley sand migration corridor (Solar Millennium 2010b as cited in the CEC RSA, 2010; CEC RSA, 2010 Appendix C).

The project would be located within two areas designated in the NECO plan as wildlife habitat management areas (WHMA): Palen-Ford WHMA and Desert Wildlife Management Area (DWMA) Connectivity WHMA. Management emphasis for the Palen-Ford WHMA is on the management of the dunes and playas within the Palen-Ford dune system. Management emphasis for the DWMA Connectivity WHMA is on the geographic connectivity for the desert tortoises for the conservation areas east of Desert Center (i.e., connectivity between the Chuckwalla DWMA and the wilderness area north of I-10). The Palen-McCoy Wilderness is approximately 3 miles to the northeast of the project site, the Chuckwalla DWMA is located approximately 2 miles to the south, and the Palen Dry Lake ACEC borders the site to the east.

3.18.1 Overview of Natural Vegetation Communities

Seven natural vegetation communities occur within the Study Area (Figure 3.18-1): Sonoran creosote bush scrub, desert dry wash woodland (Figure 3.18-2), unvegetated ephemeral dry wash, stabilized and partially stabilized desert dune, active desert dune, desert sink scrub, and dry lake bed (Figure 3.18-1). Two other cover types occur in the Study Area: agriculture and developed. Table 3.18-1 summarizes the acreage associated with each within the Biological Resources Study Area. The 4,024-acres that would be disturbed to construct, operate and maintain the project (i.e., the Project Disturbance Area) consist almost entirely of native habitats, including 148 acres of desert dry wash woodland, 164 acres of unvegetated ephemeral dry wash, 3,422 acres of Sonoran creosote bush scrub, and 285 acres of stabilized and partially stabilized desert dunes (Figure 3.18-3) (AECOM 2010a as cited in the CEC RSA, 2010).

3.18.2 Ephemeral Drainages “Riparian” Communities

Desert Dry Wash Woodland

Desert dry wash woodland (also known as microphyll woodland) is a sensitive vegetation community recognized by the California Natural Diversity Database (CNDDB) and the BLM. As discussed below, CDFG (CDFG, 2003 as cited in the CEC RSA, 2010; BLM, 2002) have designated the woodlands as State waters (Figure 3.18-2). Holland describes this community as an open to relatively densely covered, drought-deciduous, microphyll (small compound leaves) riparian scrub woodland. These habitats often are supported by braided wash channels that change

TABLE 3.18-1
NATURAL COMMUNITIES/COVER TYPES

Natural Communities and Cover Type within the Biological Resources Study Area	Project Disturbance Area[a]	One-Mile Buffer	Biological Resources Study Area[b]
Ephemeral Drainages "Riparian"			
Desert dry wash woodland	148	699	846
Unvegetated ephemeral dry wash	164	61	225
Subtotal Ephemeral Drainages "Riparian"	*312*	*760*	*1,071*
Upland			
Active desert dunes	0	684	684
Desert sink scrub	0	9	9
Dry lake bed	0	270	270
Sonoran creosote bush scrub	3,422	7,423	10,845
Stabilized and partially stabilized desert dunes	285	625	910
Subtotal Upland	*3,707*	*9,011*	*12,718*
Other Cover Types			
Agricultural Land	3	830	833
Developed	2	147	149
Subtotal Other Cover Types	*5*	*977*	*982*
Total Acres	**4,024**	**10,748**	**14,771**

a The Project Disturbance Area encompasses the disturbance resulting from the proposed construction of the project, including solar fields, transmission facilities, office and maintenance buildings, lay down area, bioremediation area, drainage channels, leach fields, and other components. It includes the impact acreage of the gen-tie line for the eastern Red Bluff Substation.
b The Biological Resources Study Area encompasses the Project Disturbance Area (area inside and outside the facility fence that would be disturbed by the project), the solar facility footprint area inside the facility fence including solar fields and other support structures and facilities, the transmission line route and buffer areas (1 mile for solar footprint, 1,000 feet for the transmission line).

SOURCE: Solar Millennium 2010m as cited in the CEC RSA, 2010 (acreages are rounded)

patterns and flow directions following every surface flow event (Figures 3.18-4 and 3.18-5) (Holland, 1986 as cited in the CEC RSA, 2010).

This vegetation community occupies the major washes that traverse the Project Disturbance Area and is dominated by an open tree layer of blue palo verde (*Parkinsonia florida*), honey mesquite (*Prosopis glandulosa* var. *torreyana*), ironwood (*Olneya tesota*), and smoke tree (*Psorothamnus spinosus*) with an understory of big galleta grass (*Pleuraphis rigida*), desert starvine (*Brandegea bigelovii*) and intermixed with creosote bush (*Larrea tridentata*) and Russian thistle (*Salsola tragus*) (Solar Millennium, 2009a as cited in the CEC RSA, 2010, AECOM, 2010a as cited in the CEC RSA, 2010).

Ironwood, palo verde, and smoke tree are desert phreatophytes, groundwater-dependent plants with deep root systems that can extend tens of feet below the ground surface to the underlying water table. Phreatophytes are known for their ability to tap into groundwater 40 feet to 200 feet or deeper, depending on the species. Other known phreatophytes in the project area desert washes include the native cat's claw (*Acacia greggii*) and the invasive exotic Saltcedar (*Tamarix* *ramosissima*). However, these deep-rooted species sometimes also occur away from the streams where they have access to deep groundwater.

Desert dry wash woodland is prevalent in the primary wash near I-10 where channel development is most pronounced and water supply more abundant. As the washes become shallower and eventually abate into the landscape further northward from I-10 within the Project Disturbance Area, desert dry wash woodland eventually is replaced by smaller washes of mixed creosote bush and big galleta grass, and a mixture of other upland and wash-dependent species. Outside major washes, desert dry wash woodland appears to be declining overall within the Project Disturbance Area as hydrological diversions upstream (diking and the construction and placement of I-10) in the early 1960s interrupted natural flow paths and reduced water flows either through obstruction and/or redistribution from the Corn Springs Wash (AECOM, 2010a as cited in the CEC RSA, 2010).

Desert dry wash woodland in the study area supports a rich community of wildlife and special status species described in this section and in Section 3.23, *Wildlife Resources*.

Unvegetated Ephemeral Dry Wash

In the project area, the smaller channels without a continuous cover of desert dry wash woodland consist of a sparse to intermittent cover of shrubs and perennial herbs. As discussed below, these habitats also are recognized and regulated as State waters and termed “Unvegetated Ephemeral Dry Wash,” which is somewhat of a misnomer. These smaller channels are subject to frequent channel avulsion and highly variable flow pathways contained within broad floodplains. Vegetative cover consists largely of mixed upland and wash-dependent perennial herbs in a community of creosote bush and big galleta grass—both along the banks and within the riparian interfluves. Like desert dry wash woodland habitats, unvegetated ephemeral dry washes also showed evidence of wildlife use by small and large mammals as movement corridors; they also provide a food and water source for many species of migrating songbirds, raptors, and reptiles. Special-status species likely to benefit from these ephemeral desert washes include desert tortoise.

3.18.3 Upland Communities

Active Desert Dunes

Active desert dunes are considered sensitive by the CNDDB (CDFG, 2003 as cited in the CEC RSA, 2010) and the BLM (NECO Plan). This community is characterized by mostly unvegetated drifted sand dunes and sand fields of five feet or less in height. Dominant and indicator plants within the Study Area for this community include desert twinbugs (*Dicoria canescens*), creosote bush, birdcage evening primrose (*Oenothera deltoides*), and Russian thistle (*Salsola tragus*). The active desert dunes are in the northeastern portion of the Study Area and northeast of Palen Dry Lake. Despite the presence of Russian thistle, the active desert dunes within the Study Area provide habitat values to many species of plants and wildlife (AECOM, 2010a as cited in the CEC RSA, 2010).

Active desert dunes only occur in the buffer area, northeast of the project site boundary within the most active part of the wind transport corridor; no active desert dune acreage occurs within the Project Disturbance Area. The active desert dunes within the Study Area are an important habitat for the MFTL, western burrowing owl, American badger, desert kit fox, and many species of locally common plant species, reptiles, and birds.

Dry Lake Bed (Playa)

There is no associated Holland or Sawyer and Keeler-Wolf classification for this community. The northeastern portion of the Study Area lies within Palen Dry Lake which is made up of clay and silt. This dry lake bed has a soft surface when wet and displays desiccation cracks once the surface dries. Dry lake beds are prone to periodic flooding with a high coefficient for swelling and contracting once dried. Palen Dry Lake is characterized as a “wet playa” because it supports significant groundwater discharge at the ground surface by evaporation (Solar Millennium2009a, as cited in the CEC RSA, 2010). Palen Dry Lake bed has no natural or artificial outlet (CEC RSA, Soil and Water Appendix A).

Sonoran Creosote Bush Scrub

Sonoran creosote bush scrub habitat characterizes most of the Study Area and intergrades with desert dry wash woodland along desert washes. This vegetation community is not designated as a sensitive plant community by BLM (NECO Plan). CNDDB (CEC RSA, 2010) recognizes many rare associations of creosote bush scrub; however, none of these were found in the Project Disturbance Area. Areas of desert pavement occur in this habitat where there is a lower density of vegetation, with cobbles ranging in size from one to three inches (Solar Millennium 2009a as cited in the CEC RSA, 2010). Sonoran creosote bush scrub occurs on well-drained, secondary soils of slopes, fans, and valleys and is the basic creosote bush scrub habitat of the Colorado Desert (Holland 1986 as cited in the CEC RSA, 2010). Within the Study Area, this community is characterized by sandy soils with a shallow clay pan. Past disturbance of the Study Area by military training and agricultural practices has resulted in a high percentage of invasive plant species, especially in the southern portion of the Study Area, consisting primarily of Sahara mustard (*Brassica tournefortii*), Mediterranean grass (*Schismus* spp.), and Russian thistle. The diversion of all the smaller washes by collector ditches south of I-10 also may contribute to the overall sparse vegetative cover and low diversity of creosote bush scrub in the Project Disturbance Area.

Stabilized and Partially Stabilized Desert Dunes

Stabilized and partially stabilized desert dunes are considered sensitive by the CNDDB (CDFG, 2003 as cited in the CEC RSA, 2010) and the BLM (NECO Plan). These dune systems, recognized as sensitive in the NECO Plan (Figure 3.18-6), are sand accumulations in the desert that have stabilized or partially stabilized as evergreen and/or deciduous shrubs and scattered, low grasses have colonized. These dunes typically occur at lower elevations than active dune systems and retain water just below the sand surface. Water availability allows deep-rooted, perennial vegetation to survive during longer drought periods (Holland, 1986 as cited in the CEC RSA, 2010).

This community occupies the margins of Palen Dry Lake and extends into the Project Disturbance Area. Desert sand dunes provide unique habitats that often support plants, mammals, reptiles and insects that are restricted to sand dunes. Dominant plants within the Study Area of this community include honey mesquite, dyebush (*Psorothamnus emoryi*), and annual desert milkvetch (*Astragalus aridus*). The dunes within the Study Area are an important habitat type for the MFTL, Harwood's milkvetch (*Astragalus insularis var. harwoodii*), western burrowing owl, American badger, desert kit fox, and a variety of common plant and wildlife species (AECOM, 2010a as cited in the CEC RSA, 2010). In addition, a potentially undescribed taxon of saltbush has been documented on the dunes just outside the Project Disturbance Area.

Figure 3.18-7 depicts the stabilized and partially stabilized desert dunes as a few discrete patches within the northern and eastern portion of the Project Disturbance Area, totaling 285 acres. Based on review of the aerial photos and mapping provided in the Applicant's Preliminary Geomorphic Aeolian and Ancient Lake Shoreline Report (Solar Millennium 2010b as cited in the CEC RSA, 2010) and in Soil & Water Appendix A of the CEC RSA, the mapping of the stabilized and partially stabilized desert dunes in the CEC Application for Certification (AFC) may under-represent the extent of this community type. Both these recent studies, which focus on sand transport, provide aerial photos that depict an extensive area of active sand dune building that occupies much of the northeastern portion of the Project Disturbance Area. In light of existing uncertainty about the precise number of acres of stabilized and partially stabilized desert dunes, the BLM uses the 285-acre figure in this PA/FEIS.

3.18.4 Other Cover Types

Areas of non-native vegetation within the Study Area include agricultural and developed areas and are limited to approximately five acres within the Project Disturbance Area. These areas, along with other conditions such as gathering/channeling water, often create favorable conditions for the occurrence and spread of non-native invasive plant species (e.g., noxious weeds), which are discussed in Section 3.18.7, *Invasive and Noxious Weeds*.

Agriculture

Neither Holland (1986 as cited in the CEC RSA, 2010) nor Sawyer and Keeler-Wolfe (2009 as cited in the CEC RSA, 2010) provide a vegetation community designation for this land cover type. CDFG characterizes farmed areas as cropland or more general categories of agriculture and urban/agriculture (CEC RSA, 2010). Areas of active and fallow agricultural fields occur within the buffer of the Study Area and not within the Project Disturbance Area. The majority of the lands mapped as agriculture within the Study Area are palm tree plantations. In fallow agricultural areas, ruderal vegetation is recolonizing with exotic plant species interspersed with some native vegetation (Solar Millennium, 2009a as cited in the CEC RSA, 2010). Fallow and active agriculture fields provide habitat to local and migratory wildlife in the form of food, cover, and shelter habitat, especially if fields are actively irrigated (Mayer and Laudenslayer, 1988 as cited in the CEC RSA, 2010).

Developed

Developed areas consist of roadways (I-10 and Corn Springs Road) and cleared land in the southern portion of the Study Area.

3.18.5 Sensitive Natural Communities and Jurisdictional Waters

Sensitive natural communities support unique or biologically important plant or wildlife species, or perform important ecological functions (e.g., bank stabilization or water filtration). These communities usually are scarce locally and regionally and therefore vulnerable to elimination. Sensitive natural communities in the desert region include many wash-dependent communities, dune and playa habitats, and groundwater-dependent plant communities (such as those discussed below), waters of the State, wetland and riparian habitats, and others that are of particular concern to BLM, CDFG and other federal, state and agencies.

The CNDDB maintains a list of all currently recognized and documented natural communities. This list provides an additional measure of a community's rarity. Communities that are marked by an asterisk are considered rare (relative to widespread and common plant communities such as Sonoran creosote bush scrub) and have a CNDDB State-rank of 3 or lower, meaning they are found over less than 10,000 to 50,000 acres or are represented by fewer than 21 to 100 occurrences. These communities may be rare due to a naturally restricted range (e.g., wash-dependent or riparian communities are restricted to narrow stringers of habitat), or widespread declines, or other factors.

The following sensitive natural communities occur in or immediately adjacent to the Project Disturbance Area, and so may be directly, indirectly, or cumulatively affected by the project:

1. Desert sink scrub (off-site)
2. Active dunes (off-site)
3. Stabilized and partially stabilized dunes
4. Desert dry wash woodland (waters of the State)
5. Unvegetated ephemeral wash (waters of the State)

Groundwater-Dependent Vegetation Communities

In the Chuckwalla Valley Groundwater Basin, the groundwater is too deep to support surface vegetation other than communities of deeper-rooted, groundwater-dependent "phreatophytes." Desert phreatophytes are able to tap into groundwater up to 40 to 200 feet or deeper, depending on the species. Groundwater elevation contour mapping by Steinemann (1989 as cited in the CEC RSA, 2010) suggests that groundwater levels are very close to the surface in the northwestern 25 percent of Palen Dry Lake but drop to over 100 feet below surface at Ford Dry Lake. Groundwater levels are even deeper in other portions of the valley (Worley-Parsons, 2009a as cited in the CEC RSA, 2010). The levels around Palen Lake are within the known rooting depths for most of the phreatophyte communities present within the zone potentially affected by the project wells, including: mesquite woodlands (Solar Millennium, 2009a, Appendix F as cited in the CEC RSA, 2010; Sawyer, 2009 as cited in the CEC RSA, 2010; Evens & Hartman, 2007 as cited in the CEC RSA, 2010; Silverman pers. comm. as cited in the CEC RSA, 2010.), alkali sink scrublands (Solar Millennium, 2009a as cited in the CEC RSA, 2010), dune communities along the margins of the playa (Solar Millennium, 2009a as cited in the CEC RSA, 2010; Silverman pers. comm. as cited in the CEC RSA, 2010), and ironwood-palo verde woodlands (Evens & Hartman, 2007 as cited in the CEC RSA, 2010; BLM, 2002). Documented communities around Palen Dry Lake also were confirmed through aerial photo interpretation and other methods.

The groundwater-dependent plant communities occurring outside the project boundary near Palen Dry Lake are also potentially vulnerable to water table drawdowns caused by groundwater pumping. The following groundwater-dependent plant communities are sensitive communities recognized by the CNDDB (CDFG, 2003 as cited in the CEC RSA, 2010) and/or BLM (NECO Plan).

1. Honey mesquite woodlands (mostly small groves also called “bosques”);
2. Microphyll woodlands (ironwood and palo verde desert dry wash woodlands)
3. Alkali (desert) sink scrubs (dominated or co-dominated by bush seep-weed, iodine bush, fourwing saltbush, spinescale, and allscale);
4. Sparsely vegetated playa lake beds; and
5. Jackass clover (or spectacle fruit) (*Wislizenia refracta*) unique stands (discussed under special-status plants)

Honey Mesquite Bosques

Shrubby “bosques” (groves) of honey mesquite occur around the open, unvegetated playa along the northwest and southwest margins of Palen Dry Lake on small coppice dunes. They also have been documented elsewhere in Chuckwalla Valley (Evans and Hartman, 2007, as cited in the CEC RSA, 2010).

Mesquite bosques are a rare and sensitive community recognized by BLM and the CNDDB (CDFG, 2003, as cited in the CEC RSA, 2010). They occur in areas with access to permanent and stable groundwater. Like other desert phreatophytes, mesquite is known for its their deep-rooting: Mesquite typically root to depths of 40 feet but have been documented to root as deep as 150 feet (Steinberg, 2001, as cited in the CEC RSA, 2010) to over 250 feet in one example at a mine shaft (Sosebee and Wan, 1989, as cited in the CEC RSA, 2010). When available, mesquite will exploit sources of deep water by growing a taproot. Mesquite also can persist on sites that have little or no groundwater by growing lengthy shallow lateral roots. In some parts of their range they are considered “facultative phreatophytes” that function as phreatophytes if unlimited water is available, but are capable of surviving on sites with limited soil water. In California, however, they are very rare outside of washes or areas with available groundwater; they also occur as a decumbent or running bush found on coppice dunes (vegetated sand mounds). These adaptations allow honey mesquite to retain most leaves in all but the most severe droughts (Ansley et al., 2004, as cited in the CEC RSA, 2010).

The fruit of honey mesquite is valuable forage for wildlife; it is quite predictable, even in drought years, annually providing an abundant and nutritious food source for numerous wildlife species upon ripening in summer (Steinberg, 2001, as cited in the CEC RSA, 2010). The fruit's pericarp is high in sugars and the seeds contain large amounts of protein. Where they occur, honey mesquite seeds form an important part of the diet of mice, kangaroo rats, ground squirrels, quail, black-tailed jackrabbit, mule deer, and many other wildlife. Mesquite flowers are eaten by numerous bird species and are an important nectar source for neotropical migrant birds in their spring passage across California deserts. Quail and many other birds eat mesquite buds and flowers in the spring and seeds during the fall and winter. Western honey mesquite communities often attract large numbers of birds that feed on the mistletoe fruit.

Microphyll Woodlands

Other known phreatophytes in the project area include the native ironwood trees, palo verde, smoke tree, and cat's claw; the invasive exotic (tamarisk), and the native chenopod shrub bush seep-weed. Most of the microphyllous trees (ironwood, palo verde, smoke tree cat's claw) occur along the many desert washes in the project area. The best examples are described above under "Desert Dry Wash Woodland." However, these deep-rooted trees sometimes also occur away from the streams where they have access to deep groundwater.

The distinction between phreatophytes depending on groundwater or exploiting surface water or soil moisture is complicated in areas where groundwater levels are not shallow. However, groundwater elevation contour mapping by Steinemann (1989), as cited in the CEC RSA, 2010, suggests that groundwater levels around Palen Lake are within the known rooting depths for most of the phreatophytes documented within the zone potentially affected by the project wells, including: mesquite woodlands (Solar Millennium, 2009a, Appendix F; Sawyer, 2009; Evens & Hartman, 2007; Silverman pers. comm., all cited in the CEC RSA, 2010), alkali sink scrubs (Solar Millennium, 2009a, as cited in the CEC RSA, 2010), dune communities along the margins of the playa (Solar Millennium, 2009a, as cited in the CEC RSA, 2010; Silverman pers. comm., as cited in the CEC RSA, 2010), and ironwood-palo verde woodlands (Evens & Hartman, 2007, as cited in the CEC RSA, 2010; BLM CDD, 2002, as cited in the CEC RSA, 2010). Documented examples around Palen Dry Lake also were confirmed through aerial photo interpretation and other methods. Groundwater levels drop to over 100 feet at Ford Dry Lake and are even deeper in other portions of the valley (Worley-Parsons, 2009a, as cited in the CEC RSA, 2010).

Alkali sink scrubs

Other known phreatophytes observed in the Project vicinity include succulent chenopod scrubs dominated by bush seep-weed, which forms pure stands over large areas around the margins of Palen Dry Lake. Bush seep-weed is a characteristic component of alkali sinks, a low-growing, grayish, succulent phreatophyte (Barbour et al., 2007, as cited in the CEC RSA, 2010) occupying fine-textured, often poorly-drained, saline-alkaline soils on or around the playa margins. It is a "facultative" wetland plant, meaning that it can occur in wetlands or non-wetlands; however, it is also a deep-rooted phreatophyte, rooting at depths of several meters to access groundwater (Patten et al., 2007, as cited in the CEC RSA, 2010).

In the project area, bush seep-weed-dominant chenopod scrubs occur in the northern portion of the project area and around Palen Dry Lake, predominantly in sand drifts over playa. These communities often occur on the margins of dry lake beds in the Colorado, Sonoran, Mojave, and Great Basin deserts typically below 4,000 feet in elevation (Holland, 1986, as cited in the CEC RSA, 2010). Chenopod scrub provides habitat value to many species of common and special-status plants, mammals, and reptiles as dispersal, foraging and cover habitats especially in association with other upland and desert wash communities. In the project area, many occurrences of the special-status Mojave fringe-toed lizard were found in this community and other communities with a fine sandy substrate. Alkaline sink scrubs in the vicinity also are associated with the rare Abram’s spurge, which is documented from less than five viable occurrences Statewide, including an occurrence at Ford Dry Lake in similar habitats.

Special Status Plants

Special-status plant species have been afforded special recognition by Federal, State, or local resource agencies or organizations. Listed and special-status species have relatively limited distributions and typically require unique habitat conditions. Special-status plant species for the purpose of the FEIS are defined as meeting one or more of the following criteria:

1. Listed as threatened, endangered or candidates for future listing under FESA;
2. Listed as threatened or endangered by CESA;
3. Listed as species of concern by CDFG;
4. A species with a California Native Plant Society (CNPS) Rank of 1A, 1B, and 2 as well as some species with a rank of 3 or 4[1];
5. BLM Sensitive species
6. A plant listed as rare under the California Native Plant Protection Act of 1977 (California Fish and Game Code Sections 1900-1913)[1]; or
7. Considered a locally significant species, that is, a species that is not rare from a State-wide perspective but is rare or uncommon in a local context such as within a county or region or is so designated in local or regional plans, policies, or ordinances.

BLM designates sensitive species as those requiring special management considerations to promote their conservation and reduce the likelihood and need for future listing under the ESA. BLM sensitive species include all Federal Candidate and Federally Delisted species that were so designated within the last 5 years, and species with a CNPS Rank of 1B that occur on BLM lands. For the purposes of this document, all BLM Sensitive species are included as special-status species.

1 As defined by the California Native Plant Protection Act, a plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code Section1901) (CDFG, 2009 as cited in the CEC RSA, 2010).

Table 3.18-2 lists all special-status plant species evaluated during the analysis that are known to occur or could potentially occur in the Study Area. Special-status plant species detected or considered possible or likely to occur based on known occurrences in the vicinity and suitable habitat present within the Study Area are discussed in more detail below. Special-status species observed during the 2009 and 2010 field surveys are indicated by bold-face type (Solar Millennium, 2009a as cited in the CEC RSA, 2010; AECOM, 2010a as cited in the CEC RSA, 2010; CEC RSA, 2010).

As shown in Table 3.18-2, several special-status plant species have the potential to occur within the Study Area. Four of these species were observed within the Study Area:

1. Harwood’s milkvetch
2. Harwood’s eriastrum
3. California ditaxis
4. ribbed cryptantha

Utah vining milkweed was observed outside the Study Area to the east and was documented in the Applicant’s July 2010 spring survey report (Solar Millennium, 2010m as cited in the CEC RSA, 2010). An undescribed taxon of saltbush has been reported and documented in the dunes just north of the project boundary (Andre, pers. comm. as cited in the CEC RSA, 2010); it was mapped in the Applicant’s preliminary spring 2010 survey report (AECOM, 2010d, as cited in the CEC RSA, 2010). It has no official status or recognition at this time; however, the BLM State Botanist has indicated that any undescribed taxa should be treated as BLM Sensitive species (Christina Lund, pers. comm., as cited in the CEC RSA, 2010), and thus it is included here as a special-status species. Of the six species observed during the surveys, only the Harwood’s milkvetch, California ditaxis, and ribbed cryptantha occur within the Project Disturbance Area.

Several additional species were included in the analysis because they are documented or reported to occur within Chuckwalla Valley in similar habitats, or along washes in the surrounding foothills; however, they were not observed in the Study Area during the spring 2009 or 2010 surveys (AECOM, 2010d as cited in the CEC RSA, 2010; Solar Millennium, 2009a, as cited in the CEC RSA, 2010; Solar Millennium, 2010k as cited in the CEC RSA, 2010; Solar Millennium, 2010 as cited in the CEC RSA, 2010): Jackass clover (discussed above), Palmer’s jackass clover, mesquite nest straw, dwarf germander, Abram’s spurge, glandular ditaxis, desert unicorn plant, winged cryptantha, and Las Animas colubrina. Another rare species, morning-glory heliotrope (*Heliotropium convolvulaceum var. californicum*), has been observed in the Chuckwalla Valley and Palo Verde mesa, but this new range extension from the Arizona flora has no status yet in California (Silverman, pers. comm. as cited in the CEC RSA, 2010).

The following late-blooming special-status plants have some potential to occur based on suitable habitat and known occurrences within the Sonoran Desert region of California: Abram’s spurge, flat-seeded spurge, lobed ground cherry, and glandular ditaxis. Fall plant surveys were completed in October, 2010 and no special-status plants were found in the study area.

TABLE 3.18-2
SPECIAL-STATUS SPECIES KNOWN* OR POTENTIALLY OCCURRING IN THE BIOLOGICAL RESOURCES STUDY AREA

Common Name	Scientific Name	Status State/Fed/CNPS/BLM/ Global Rank/State Rank
PLANTS		
Chaparral sand verbena	*Abronia villosa var. aurita*	__/__/1B.1/BLM Sensitive_/G5T3T4/S2.1
Angel trumpets	*Acleisanthes longiflora*	__/__/2.3/__/G5/S1.3
Desert sand parsley	*Ammoselinum giganteum*	__/__/2.3/__/G2G3/SH
Small-flowered androstephium	*Androstephium breviflorum*	__/__/2.2/__/G5/S2*
Harwood's milkvetch	***Astragalus insularis var. harwoodii***	**__/__/2.2/__/G5T3/S2.2**
Coachella Valley milkvetch	*Astragalus lentiginosus var. coachellae*	__/FE/1B.2./ BLM Sensitive / G5T2/S2.1
California ayenia	*Ayenia compacta*	E/__/2.3/__/G4/S3.3
Pink fairy duster	*Calliandra eriophylla*	__/__/2.3/__/G5/S2.3
Sand evening-primrose	*Camissonia arenaria*	__/__/2.2/__/G4/S2
Crucifixion thorn	*Castela emoryi*	__/__/2.3/__/G3/S2.2
Abram's spurge	*Chamaesyce abramsiana*	__/__/2.2/__/G4/S1.2
Arizona spurge	*Chamaesyce arizonica*	R/__/2.3/__/G5/S1.3
Flat-seeded spurge	*Chamaesyce platysperma*	__/__/1B.2/ BLM Sensitive / G3/S1.2
Las Animas colubrina	*Colubrina californica*	__/__/2.3/__/G4/S2S3.3
Spiny abrojo/Bitter snakeweed	*Condalia globosa var. pubescens*	__/__/4.2/__/G5T3T4/S3.2
Foxtail cactus	*Coryphantha alversonii*	__/__/4.3/__/G3/S3.2
Ribbed cryptantha	***Cryptantha costata***	**__/__/4.3/__/G4G5/S3.3**
Winged cryptantha	*Cryptantha holoptera*	__/__/4.3/__/G3G4/S3
Wiggins' cholla	*Cylindropuntia wigginsii (syn=Opuntia wigginsii)*	__/__/3.3/__/G3?Q/S1.2
Utah milkvine	*Cynanchum utahense*	__/__/4.2/__/G4/S3.2
Glandular ditaxis	*Ditaxis claryana*	__/__/2.2/__/G4G5/S1S2
California ditaxis	***Ditaxis serrata var. californica***	**__/__/3.2/__/G5T2T3/S2.2**
Cottontop cactus	*Echinocactus polycephalus var. polycephalus*	__/__/__/__/__/__
Harwood's Eriastrum	***Eriastrum harwoodii***	**__/__/1B.2/BLM Sensitive_/G2/S2**
California satintail	*Imperata brevifolia*	__/__/2.1__/G2/S2.1
Pink velvet mallow	*Horsfordia alata*	__/__/4.3/__/G4/S3.3
Bitter hymenoxys	*Hymenoxys odorata*	__/__/2/__/G5/S2
Spearleaf	*Matelea parvifolia*	__/__/2.3/__/G5/S2.2
Argus blazing star[a]	*Mentzelia puberula*	__/__/__/__/__/__
Slender woolly-heads	*Nemacaulis denudata var. gracilis*	__/__/2.2/__/G3G4T3/S2S3
Lobed cherry	*Physalis lobata*	__/__/2.3/__/G5/S1.3
Desert portulaca	*Portulaca halimoides*	__/__/4.2/__/G5/S3
Desert unicorn plant	*Proboscidea althaeifolia*	__/__/4.3/__/G5/S3.3
Orocopia sage	*Salvia greatae*	__/__/1B.3./ BLM Sensitive /G2/S2.2
Desert spikemoss	*Selaginella eremophila*	__/__/2.2./__/G4/S2.2
Cove's cassia	*Senna covesii*	__/__/2.2/__/G5/S2.2
Mesquite nest straw	*Stylocline sonorensis*	__/__/1A/__/G3G5/SX
Dwarf germander	*Teucrium cubense ssp. depressum*	__/__/2.2/__/G4G5T3T4/S2

TABLE 3.18-2 (Continued)
SPECIAL-STATUS SPECIES KNOWN OR POTENTIALLY OCCURRING IN THE BIOLOGICAL RESOURCES STUDY AREA

Common Name	Scientific Name	Status State/Fed/CNPS/BLM/ Global Rank/State Rank
PLANTS		
Jackass clover	*Wislizenia refracta ssp. refracta*	__/__/2.2/__/G5T5/S1.2
Palmer's jackass clover[b]	*Wislizenia refracta ssp. palmeri*	__/__/Proposed 1B/__/__/__
"Palen Lake atriplex"[c]	***Atriplex* sp. nov. J. Andre (*Atriplex canescens* ssp)**	**__/_ / _/BLM Sensitive/__/__**

NOTES:

* Species in bolded type were found in the Biological Resources Study Area

a Proposed new addition to the CNPS Inventory (Andre, pers. comm. as cited in the CEC RSA, 2010)
b Proposed new addition to the CNPS Inventory (Silverman, pers. comm. as cited in the CEC RSA, 2010)
c Proposed new taxon (Andre, pers. comm.). BLM may consider proposed new taxa as BLM Sensitive (Lund, pers. comm. as cited in the CEC RSA, 2010)

Status Codes:

Federal
FE = Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT = Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities <www.fws.gov/migratorybirds/reports/BCC2002.pdf>

State
CSC = California Species of Special Concern Species of concern to CDFG because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
CFP = California Fully Protected
SE = State listed as endangered
ST = State listed as threatened
WL = State watch list

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

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

Global Rank/State Rank
Global rank (G-rank) is a reflection of the overall condition of an element throughout its global range. Subspecies are denoted by a T-Rank; multiple rankings indicate a range of values
G1 = Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals
G2 = 6-20 EOs OR 1,000-3,000 individuals
G3 = 21-100 EOs OR 3,000-10,000 individuals
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.

State rank (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank. An H-rank indicates that all sites are historical
S1 = Less than 6 EOs OR less than 1,000 individuals
S1.1 = very threatened
S1.2 = threatened
S1.3 = no current threats known
S2 = 6-20 EOs OR 1,000-3,000 individuals
S2.1 = very threatened
S2.2 = threatened
S2.3 = no current threats known
S3 = 21-100 EOs or 3,000-10,000 individuals
S3.1 = very threatened
S3.2 = threatened
S3.3 = no current threats known

SOURCE: CNDDB, 2010 as cited in the CEC RSA, 2010

The special-status plants found in the Study Area during the 2009 and 2010 spring surveys are described below, followed by a discussion of species that are considered to have some potential for occurrence in the Study Area based on the presence of suitable habitat and known occurrences in the region.

Harwood's Milkvetch

Harwood's milkvetch has a CNPS Rank of 2.2, meaning that is it fairly threatened in California, but more common elsewhere. It is also a covered species under the NECO Plan (Figure 3.18-8). It has a CNDDB (NatureServe) Global rank of G5T3/S2.2, which denotes a subspecies whose range in California is imperiled, and that is rare, uncommon or threatened but not immediately imperiled outside California. It is an annual herb that mainly occurs in Sonoran desert scrub throughout the Colorado Desert (BLM 2002). This subspecies is found in desert dunes and sandy or gravelly areas throughout the Mojave and Sonoran Deserts that cover portions of Imperial, Riverside, and San Diego counties (CNPS, 2009 as cited in the CEC RSA, 2010). Historic and recent collections include Ogilby Road in Imperial County and three locales west of Blythe, the Pinto Basin, and the Chuckwalla Basin in Riverside County. Harwood's milkvetch has also been reported from Baja California, Sonora Mexico, and portions of Yuma County, Arizona (Reiser, 1994). There are 97 CNDDB records for this species, including several within the vicinity of the project site (CNDDB, 2010 as cited in the CEC RSA, 2010).

Review of the occurrence data in the Consortium of California Herbaria resulted in the detection of three new occurrences that were not in the CNDDB. All of these are historical occurrences. Of the total 46 occurrences in California (CNDDB plus new additional occurrences), nine of these are protected under Park Service or State Park ownership. A total of 11 records are historical records. Of the total, 16 occurrences have documented threats including development, OHV, agriculture, transmission lines, road maintenance, and trash dumping.

A total of 146 Harwood's milkvetch plants were documented at multiple locations in the Study Area during the 2009 and 2010 surveys (Solar Millennium, 2010k as cited in the CEC RSA, 2010). Seven of these occur within the Project Disturbance Area. Many new occurrences were documented in Chuckwalla Valley and the Palo Verde mesa during the 2010 surveys for the study areas of two nearby projects: the Blythe Solar Power Project (Solar Millennium, 2010k as cited in the CEC RSA, 2010) and the Genesis Solar Energy Project (Solar Millennium, 2010k as cited in the CEC RSA, 2010).

Ribbed Cryptantha

Ribbed cryptantha has a CNPS Rank of 4.3, meaning that it has limited distribution in California but it is not very threatened as defined by CNPS in California. It typically occurs in loose friable soils in the eastern Mojave and Sonoran Deserts in Imperial, Riverside, San Diego, and San Bernardino counties and into Arizona and south to Baja California, Mexico (CNPS, 2009 as cited in the CEC RSA, 2010). It commonly occurs in stabilized and partially stabilized desert dunes and sandy areas of Sonoran and Mojavean desert creosote bush scrub. There are 116 records of this species from several locations throughout Riverside, Imperial, San Diego, and Imperial counties in the Consortium of California Herbaria database; the nearest collection is from the Palen Valley approximately three miles east of the Desert Center Airport (CCH, 2010 as cited in the CEC RSA, 2010).

A large local population of this species was found during the 2010 surveys for this and other projects in the vicinity (Solar Millennium, 2010k as cited in the CEC RSA, 2010; TTEC, 2010m as cited in the CEC RSA, 2010; AECOM, 2010v as cited in the CEC RSA, 2010). None of the surveyors have reported that the occurrences exhibit local or regional significance. Plant density was estimated for this species using sub-sampling methods, and an estimate of 8,903 plants per acre was used to calculate total plant numbers. Approximately 1.4 X 10^7 plants on 1,593 acres of occupied ribbed cryptantha acreage were estimated within the Study Area (Solar Millennium, 2010m, Table 3 as cited in the CEC RSA, 2010).

Harwood's Eriastrum

Harwood's eriastrum, also known as Harwood's phlox, or Harwood's woollystar, is a BLM Sensitive spring annual currently known from only 14 documented locations worldwide. It has a Rare CNPS of 1B.2, which indicates it is rare, threatened or endangered throughout its range. It is a California endemic with a global range restricted to San Diego, Riverside, and San Bernardino counties, typically occurring in dunes at the margins around dry lakes such as Dale, Cadiz, and Soda lakes. Surveys conducted in spring 2010 for the Blythe Solar Power Project located this plant primarily in the sandy areas south of I-10, where 2,134 plants were located and mapped (AECOM, 2010v as cited in the CEC RSA, 2010). All of these plants were identified in the general vicinity of Southern California Edison's proposed Colorado River substation. All stabilized and partially stabilized dunes are considered to be suitable habitats for this species in the Study Area.

Review of the occurrence data in the Consortium of California Herbaria identified two new occurrences that were not in the CNDDB. Both of these are historical records from 1939 and 1958. Of the 14 total occurrences in California (12 CNDDB plus two additional historic records), three are protected under Park Service or State Park ownership. A total of three records are historical records. Four of these occurrences have documented threats, including OHV and non-native plant impacts.

This species was not observed during 2009 field surveys; however, a total of two Harwood's eriastrum plants were observed in one area of the partially-stabilized dunes in the northeast corner of the Study Area during spring 2010 field surveys (Solar Millennium, 2010m, Table 3 as cited in the CEC RSA, 2010). No Harwood's eriastrum were found within the Project Disturbance Area.

Utah Vining Milkweed

Utah twining milkweed has a CNPS Rank of 4.2, meaning that it has limited distribution in California and that some of the occurrences are threatened. This twining perennial occurs in sandy or gravelly soils in Mojavean and Sonoran desert scrub habitats or washes from approximately 500 feet to 4,300 feet in elevation (CNPS, 2009 as cited in the CEC RSA, 2010).

The distribution of this species includes San Diego, Imperial, Riverside, and San Bernardino counties and portions of Arizona, Nevada and Utah.

There are 58 records of this species from the Consortium of California Herbaria database primarily from San Bernardino and San Diego counties. There is one record from the Big Maria Mountains from wash and stabilized dune habitat at approximately 1,200 feet elevation (CCH, 2010 as cited in the CEC RSA, 2010). Until recently discovered growing on the Palo Verde Mesa (AECOM, 2010v as cited in the CEC RSA, 2010), it was believed that the project was outside of the range of this species. This species was not found during 2009 field surveys; however, it was observed incidentally at a single location outside of the Study Area, east of Palen Lake. No Utah vining milkweed plants were observed within the Project Disturbance Area or buffer area during 2009 or 2010 field surveys (see Figure 3.18-9).

California Ditaxis

California ditaxis has a CNPS Rank of 3.2, meaning that its taxonomic status was not resolved during its last status review. Its occurrences in California are fairly endangered (CNPS, 2009 as cited in the CEC RSA, 2010). It has a CNDDB rank of S2.2, meaning that there are 6-20 occurrences or 1,000-3,000 individuals and the plant faces threats. This species occupies Sonoran desert scrub, and prefers sandy washes and alluvial fans of the foothills and lower desert slopes, from 100 to 3,000 feet above mean sea level. Reports of this species are known from San Bernardino, Riverside, Imperial, San Diego, and Sonora, Mexico (CNPS, 2009 as cited in the CEC RSA, 2010). There are 17 records from the CNDDB (2010) primarily from Riverside.

Review of the occurrence data in the Consortium of California Herbaria resulted in the detection of four new occurrences that were not in the CNDDB. Three of these are historical records from between 1921 and 1952; however, one more recent occurrence was found at Anza-Borrego Desert State Park near Starfish Cove Canyon. Of the total 21 occurrences in California (CNDDB plus new additional occurrences), two of these are protected under Park Service ownership. A total of four records are historical records. Five of these occurrences have documented threats, including, OHV, road grading, and construction of a new power line.

A total of 22 plants were documented in the Study Area during the 2010 surveys; half of which (11) occur within the Project Disturbance Area along the gen-tie line (Solar Millennium 2010m, Table 3 as cited in the CEC RSA, 2010).

Atriplex sp. nov

A potentially new, undescribed taxon of saltbush (*Atriplex*) was discovered on the saline playa margins of Palen Dry Lake last year by a botanist with the U.C. Reserve System (Andre and La Doux, pers. comm. as cited in the CEC RSA, 2010). It resembles the common four-wing saltbush (*Atriplex canescens*), a common plant of dunes which has very linear leaves, but the undescribed taxon has obovate leaves that distinguish it from all other *Atriplex canescens* subspecies (Andre, pers. comm.). The Applicant’s botanical consultant tentatively is treating it as a new variety of the common four-wing saltbush.

The undescribed Atriplex first was collected in 2005 at the “dry lake” just northeast of the Interstate 15/ Highway 95 junction approximately 35 miles east and northeast of Las Vegas, Nevada. The first voucher/observation of it in California was at Palen Lake in 2009. There also is potential for it to occur along the I-8 corridor in Imperial County. Although it is distinct from the common *Atriplex canescens* in its obovate leaves, it would be easy to overlook the undescribed taxon where they co-occur, even by experienced botanists. The undescribed taxon is more confined to subsaline or saline playa margins, though not necessarily so. Andre (pers. comm.) indicated that it also may have been observed in the Ford Dry Lake area (unconfirmed) and it has been observed in other saline (but non-playa) habitats on remnants of the lower Colorado River flood plain (Andre, pers. Comm.; Silverman, pers. comm. as cited in the CEC RSA, 2010).

Several plants of the new four wing saltbush were found within in the buffer area, northeast of the project site during spring 2010 field surveys (see Figure 3.18-2).

Desert Unicorn Plant

Desert unicorn plant has a CNPS Rank of 4.3, meaning it has limited distribution in California and its susceptibility to threat is presently low. It is also a covered species under the NECO Plan. This species is a low-growing, perennial that occurs in sandy washes within Sonoran desert scrub in San Bernardino, Imperial, Riverside, and San Diego counties of California. There are 13 records known from the NECO planning area in Milipitas Wash, Chuckwalla Valley, and Chemehuevi Valley (BLM, 2002). The blooming period is from May to August (CNPS, 2009 as cited in the CEC RSA, 2010). Although it is a late-season bloomer it has large and distinctive seed pods that can be detected during routine spring surveys. It has a fleshy root system that can remain dormant in dry years. There are 36 records in the Consortium of California Herbaria, several of which are from the Chuckwalla Mountains and Desert Center area, including the project area (CCH, 2010 as cited in the CEC RSA, 2010). This species was not observed during Spring 2009 or 2010 field surveys performed for the project; however, this plant has been identified in the region for other solar projects (AECOM, 2009d as cited in the CEC RSA, 2010, 2009a,b as cited in the CEC RSA, 2010).

Abram’s Spurge

Abram’s spurge is a late-season, ephemeral annual that responds to summer monsoonal rains but dries quickly and cannot be detected during routine spring surveys. It has CNPS Rank of 2.2, meaning it is fairly rare in California but more common elsewhere (CNPS, 2009 as cited in the CEC RSA, 2010). Habitat consists of sandy flats in creosote bush scrub from approximately 600 to 2,700 feet above mean sea level. This summer annual occurs in halophytic (saline-alkaline) scrub flats, playas, and along inlets and floodplains of playas and always seems to prefer the lower floodplain ecotone, but it can also extend higher up in the floodplain drainages (Silverman, pers. comm. as cited in the CEC RSA, 2010). Based on Consortium of California Herbaria database records for this species, it occurs in sandy soil often along dry lake margins in Riverside, San Diego, and Imperial counties, whereas documented occurrences in San Bernardino County occur on coarser, possibly sandy loams. Abram’s spurge occurs from San Bernardino County to Imperial and eastern San Diego counties to Arizona, Nevada, Mexico, and Baja

California. The CNDDB (2010 as cited in the CEC RSA, 2010) lists 15 occurrences of this plant within Riverside, Imperial, San Bernardino, and San Diego counties in California of these, seven are protected under Park Service, CDFG, or State Park ownership. A total of four records are historical and one of these occurrences has documented threats which include grazing. A 2000 CNDDB record from a location near the project site: approximately 0.5 mile east of Ford Dry Lake on Gasline Road just south of I-10, is reported as a “substantial population” (CNDDB, 2010 as cited in the CEC RSA, 2010).

The blooming period is identified by CNPS as September through November (CNPS, 2009 as cited in the CEC RSA, 2010). However, because the project site occurs in an area known for bi-modal rain patterns and late summer/fall rains, this species typically blooms during summer or fall months only following monsoonal rains (>+/- 0.10 inch) (Silverman, pers. comm.). On average, August receives the most rainfall, although rainfall is also received during winter months of December, January, and February. Regional botanical experts have concluded that this, and other summer annuals, may be missed if surveys are only conducted within the mid-March through mid-April window, and that a full inventory at multiple temporal windows are necessary in order to capture all appropriate growing conditions (typically following 12 to 18 mm rain events) (CEC, 2009a as cited in the CEC RSA, 2010).

This species was not identified during spring 2009 or 2010 botanical surveys but surveys were not conducted during a time of year adequate for detecting this species. Fall surveys completed in October, 2010, did not detect this species in the study area (AECOM, 2010 as cited in the CEC Commission Decision, 2010)

Flat-seeded Spurge

Flat-seeded spurge has a CNPS Rank of 1B.2, meaning it is rare, threatened, or endangered in California and elsewhere and some of the occurrences face known threats. It is a BLM Sensitive species and has a CNDDB element rank of S1.2 meaning that there are less than 6 occurrences or there are fewer than 1,000 individuals known and they are threatened. This species occurs in desert dunes and Sonoran desert scrub in sandy places or shifting dunes at elevations from approximately 200 to 300 feet. Some experts speculate that the species may be a waif in California and note that it is more common in Arizona and Mexico (CNDDB, 2010 as cited in the CEC RSA, 2010), but overall, little is known or can be concluded about this species (LaDoux, pers. comm. as cited in the CEC RSA, 2010). This ephemeral summer annual blooms February through September (CNPS, 2009 as cited in the CEC RSA, 2010). There are four CNDDB records of this species for the entire state of California, only one of which is from Riverside County; the closest occurrences are approximately 50 miles away.

Review of the occurrence data in the Consortium of California Herbaria resulted in the detection of one new occurrence that was not in the CNDDB. This occurrence is a historical record from 1933. Of the total five occurrences in California (CNDDB plus the new additional occurrence), one is protected under State Park ownership. Three records are historical records; none has documented threats.

This species was not observed during spring 2009 or 2010 botanical surveys. Although there are no documented nearby occurrences, the project occurs within its range, suitable habitat is present, and as an ephemeral summer annual it may be under-surveyed and its potential to occur cannot be dismissed (LaDoux, pers. comm. as cited in the CEC RSA, 2010).

Glandular Ditaxis

Glandular ditaxis has a CNPS rank of 2.2, meaning that is it rare, threatened, or endangered in California, but more common elsewhere, and some of the California occurrences face known threats. It has a CNDDB element rank of S1.2, meaning that there are less than six occurrences or 1,000 individuals and it is threatened. This plant species grows from sea level to approximately 1,400 feet above mean sea level in Mojavean and Sonoran desert scrub, in the sandy soils of dry washes and rocky hillsides. Glandular ditaxis, an annual or short-lived perennial, blooms from October through March (CNPS, 2009 as cited in the CEC RSA, 2010); while it can be detected during spring surveys, it is easier to detect in fall following the start of the rainy season (Silverman, pers. comm. as cited in the CEC RSA, 2010).

Review of the occurrence data in the Consortium of California Herbaria resulted in the detection of three new occurrences that were not in the CNDDB. All of these are historical records from 1932. Of the total 21 occurrences (CNDDB plus new additional occurrences), one is protected under CDFG land ownership. Six records are historical occurrences. One has documented threats, including land development, and is likely extirpated. This species was not observed during spring 2009 or 2010 botanical surveys performed for the project. Fall surveys completed in October, 2010, did not detect this species in the study area (AECOM, 2010 as cited in the CEC Commission Decision, 2010).

Lobed Ground Cherry

Lobed ground cherry is a late season perennial that blooms September to January. It has a CNPS Rank of 2.3, meaning that is rare, threatened, or endangered in California, but more common elsewhere and not very endangered in California. It has a CNDDB element rank of S1.3, meaning that there are fewer than six occurrences but no current threats are known. This species occurs in Mojavean desert scrub on decomposed granite soils, playas, and alkaline dry lake beds. This species occurs from approximately 1,500 feet to 2,400 feet above mean sea level. There are four occurrence records in the CNDDB (2010 as cited in the CEC RSA, 2010), and six additional collection records in the Consortium of California Herbaria database (CCH, 2010 as cited in the CEC RSA, 2010); all records are from San Bernardino County.

Review of the occurrence data in the Consortium of California Herbaria resulted in the detection of two new occurrences that were not in the CNDDB. Both of these are more recent occurrences, including one from Joshua Tree National Park and one in the eastern Mojave Desert. Of the total six occurrences in California (CNDDB plus new additional occurrences), none is protected under Park Service or other agency land ownership. None is an historical record and none has documented threats. This species was not observed during spring 2009 or 2010 botanical surveys performed for the project. Fall surveys completed in October, 2010, did not detect this species in the study area (AECOM, 2010 as cited in the CEC Commission Decision, 2010).

Dwarf Germander

Dwarf germander has a Rare Plant Rank of 2.2, meaning that is it rare, threatened, or endangered in California, but more common elsewhere, and fairly endangered in California. It has a CNDDB element rank of S2. This species occurs in desert dune, playa margins, and Sonoran desert scrub habitats from approximately 100 feet to 1,200 feet. This species typically blooms from March to May but may also bloom from September through November. This species typically occurs in sandy soils and wash habitats and is known from 5 occurrences in California (CNPS, 2009 as cited in the CEC Commission Decision, 2010).

Of the five occurrences in California, one occurs in a BLM Desert Wildlife Management Area. Three records are historical records, and none of these occurrences have documented threats. This species was not observed during spring 2009 or 2010 botanical surveys performed for the project. Fall surveys completed in October, 2010, did not detect this species in the study area (AECOM, 2010 as cited in the CEC Commission Decision, 2010).

Jackass Clover

Jackass clover has a CNPS Rank of 2.2 and considered fairly endangered in California but more common outside California. It has a CNDDB element rank of 1.2 which means there are 6 or fewer occurrences or fewer than 1,000 individuals and they are threatened. Jackass clover inhabits desert dunes in Mojavean desert scrub, playas, or Sonoran desert scrub. This species commonly is associated with sandy washes, roadsides, or alkaline flats, at elevations from 425 to 2,630 feet.

The CNDDB (2010 as cited in the CEC RSA, 2010) reports 6 occurrences in California, two of which are protected under National Park Service ownership. Two of the occurrences are based on historical records. One of these occurrences has documented threats, including development. Jackass clover also was documented at several locations from the northern to southern end of Palen Lake in dune habitats during a detailed vegetation mapping and classification project conducted by the CNPS Vegetation Program for BLM (Evens & Hartman, 2007 as cited in the CEC RSA, 2010). The populations of jackass clover at Palen Lake are considered to be unique stands and are included in this analysis as a sensitive natural community. This species was not observed during spring 2009 or 2010 botanical surveys performed for the project.

Palmer's Jackass Clover

Palmer's jackass clover is a proposed new addition to the CNPS inventory (Silverman, pers. comm.). CNPS Rank of 2.2, indicating that it is fairly endangered in California but more common elsewhere. It is a perennial herb that occupies sandy washes, and Sonoran desert scrub habitat from sea level to 650 feet. There are no CNDDB records for this species (CNDDB, 2010 as cited in the CEC RSA, 2010). Review of the occurrence data in the Consortium of California Herbaria resulted in the detection of seven occurrences that were not in the CNDDB. Four are historical records from between 1937 and 1952; however, two more recent occurrences were found in the

Chocolate-Chuckwalla Mountains region, one southeast of Palen Dry Lake and one near the Palen Sand Dunes. No information on land ownership or documents of threats is available from the Consortium of California Herbaria. One occurrence in the Chuckwalla Valley is reported to be threatened by solar development, water table diversions, OHV activity, and agriculture. This species was not observed during spring 2009 or 2010 botanical surveys performed for the project.

Winged Cryptantha

Winged cryptantha has a CNPS Rank of 4.3, meaning that is have a limited distribution in California but is not very endangered. This is a spring-blooming annual that occurs in Mojavean and Sonoran desert scrub from 300 feet to approximately 5,000 feet above mean sea level. This species blooms from March through April (CNPS, 2009 as cited in the CEC RSA, 2010). Winged cryptantha is found in California, Arizona, and Nevada. There are 79 records of this species in the Consortium of California Herbaria database from Riverside, Imperial, San Bernardino, and San Diego counties, representing 50 to 60 element occurrences (CCH, 2010 as cited in the CEC RSA, 2010). This species has low to moderate potential to occur at the project site. This species was not observed during spring 2009 or 2010 botanical surveys performed for the project, but was observed near the proposed Colorado Substation at the southeastern end of Chuckwalla Valley, south of I-10 (Solar Millennium, 2010 as cited in the CEC RSA, 2010).

Las Animas Colubrina

Las Animas colubrina has a CNPS Rank of 2.3, indicating it is not very endangered in California and more common elsewhere (CNPS, 2009 as cited in the CEC RSA, 2010). It is a covered species under the NECO Plan. It is an evergreen to semi-evergreen shrub that occurs in Mojavean and Sonoran desert scrub (creosote bush series) and occurs at elevations from approximately 30 to 3,000 feet. It primarily occurs in dry canyons or headwater reaches of desert washes with gravelly, sandy soils. The distribution of this species includes San Diego, Imperial and Riverside counties; portions of Arizona; Baja California; and Sonora, Mexico. This species has been reported from isolated desert locales in Joshua Tree National Park, the Eagle Mountains, and Chuckwalla Mountains (Reiser, 1994 as cited in the CEC RSA, 2010). There are approximately 27 occurrences primarily from the Chocolate Mountains area (CNDDB, 2010 as cited in the CEC RSA, 2010; BLM, 2002). This species typically blooms from April through June.

Review of the occurrence data in the Consortium of California Herbaria resulted in the detection of 12 new occurrences that were not in the CNDDB. Of these, eight are historical records from between 1930 and 1966; however, four are more recent occurrences found in the Sonoran (Colorado) Desert, including several occurrences in the mountains and foothills surrounding Chuckwalla Valley (CCH, 2010 as cited in the CEC RSA, 2010). Of the 36 records in California (CNDDB plus new additional occurrences), six are protected under Park Service, State Park, or BLM DWMA land ownership. A total of 11 records are historical records. None of these occurrences has documented threats. This species was not identified during Spring 2009 or 2010 botanical surveys performed for the project; however, this plant has been identified in the region during surveys performed for other solar projects (AECOM, 2009d as cited in the CEC RSA, 2010; GSEP 2009a,b as cited in the CEC RSA, 2010).

Other Special Status Plant Species

Table 3.18-3 shows Special Status Plant Species that could occur in the Study Area but were not detected during spring and fall surveys and are not expected to occur due to a low to moderate probability of occurrence.

Jurisdictional Waters

A formal jurisdictional delineation for regulated waters was conducted by the Applicant to determine the extent of potential jurisdictional waters of the U.S. and/or waters of the State within the site. This includes waters (and/or wetlands) regulated under the federal Clean Water Act and/or streams and associated habitat regulated under the California Fish and Game Code. The Applicant has requested a jurisdictional determination (JD) of isolated waters (non-jurisdictional waters of the U.S.) from the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (USEPA) (Galati & Blek 2009a as cited in the CEC RSA, 2010). The application assumes there are no potential jurisdictional waters of the U.S. within the Project Disturbance Area based on the fact that the features occur in a closed basin with no identifiable outlet and have no direct hydrologic connection to any navigable waters. Both vegetated and unvegetated dry washes include unique habitat that is distinct from the surrounding uplands, providing more continuous vegetation cover and microtopographic diversity, as well as movement corridors and refuge for a variety of wildlife. Both the wash-dependent and upland vegetation along these washes drive food webs, and provide seeds for regeneration, habitat for wildlife, and access to water when present, as well as creating cooler, more hospitable microclimatic conditions essential for a number of plant and animal species.

A revised jurisdictional delineation report was submitted as part of the Streambed Alteration Agreement application to CDFG on November 25, 2009, which includes all delineated aquatic features, including desert washes which lack a continuous component of desert wash woodland but provide other wildlife habitat function and values (Galati & Blek 2009a as cited in the CEC RSA, 2010). The revised delineation also includes areas of waters and wash-dependent vegetation downstream of the project footprint that are likely to be indirectly affected by the diversion of waters at the upstream side of the project into a perimeter stormwater conveyance channel. This area of potential indirect effect includes the full extent of the downstream washes that would be deprived of flows. Additionally, the delineation was revised to include the full floodplain width of compound features of multiple small channels with variable flow pathways, including the interfluves of mixed upland and wash-dependent vegetation.

The total (302.8 acres) area of all waters of the State delineated within the Project Disturbance Area includes 141.0 acres of desert dry wash woodland and 161.8 acres of other ephemeral desert washes. A total of 61.1 acres of jurisdictional State waters were delineated downstream of the Project Disturbance Area, encompassing the full downstream reach of waters that would likely be indirectly affected by the diversion of waters at the upstream edge of the Project Disturbance Area. The 61.1 acres of off-site waters includes: 27.5 acres of desert dry wash woodland and 33.6 acres of other ephemeral desert washes.

TABLE 3.18-3
SPECIAL-STATUS PLANT SPECIES WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Plants		
Angel trumpets *Acleisanthes longiflora*	This species occurs in Sonoran desert scrub on carbonate soils from approximately 200 to 300 feet above MSL. There are two records from the Consortium of California Herbaria from the Colorado Desert, Palo Verde area (CCH, 2010 as cited in the CEC RSA, 2010).	This species has a low potential to occur since the elevation range of the project site is appropriate for this species although the Study Area does not support carbonate/limestone derived soils in mountainous areas.
Argus blazing star *Mentzelia puberula*	This species occurs in desert scrub and desert woodlands with limestone and granitic slopes above 2,000 feet in elevation. Based on 13 Consortium of California Herbaria database records, this species has been collected from Riverside, San Bernardino, and Imperial Counties from the Little and Big Maria Mountains in Riverside County.	This species is not expected to occur in the Study Area due to lack of limestone and granitic slopes, which are soil types preferred by this species that are absent from the Study Area. The project site is located at approximately 130 to 200 feet above MSL, which is well below the typical elevation where this species typically occurs.
Arizona spurge *Chamaesyce arizonica*	This species occupies sandy, areas in Sonoran desert scrub and has been reported from Imperial, Riverside, and San Diego Counties and portions of Arizona and Baja California (CNPS, 2009 as cited in the CEC RSA, 2010) from approximately 150 feet to 1,200 feet above MSL. There are 7 database records from the Consortium of California Herbaria primarily from San Diego County but also from Riverside and Imperial Counties often from sandy areas and transition areas between chaparral and desert habitats. The record from Riverside County is near Palm Springs from Andreas Canyon (CCH, 2010 as cited in the CEC RSA, 2010).	Arizona spurge has a low potential to occur within the Study Area due to the presence of suitable habitat and appropriate elevation range of the project site.
Bitter hymenoxys *Hymenoxys odorata*	Bitter hymenoxys grows riparian scrub and Sonoran desert scrub from 150 feet to 500 feet above MSL. This species blooms from February through November (CNPS, 2009 as cited in the CEC RSA, 2010). There are five CNDDB records for this species for the entire State of California, two of which occur in Riverside County; the nearest CNDDB occurrence is a historical record approximately 5 miles southeast of the Project Area from sandy slope, low bottom lands and overflow flats (CNDDB, 2010 as cited in the CEC RSA, 2010).	This species was not found during spring 2009 or 2010 field surveys. This species is a target plant species to be surveyed for during spring 2010 botanical surveys within the transmission line, substation, and associated road spurs. This species has a potential to occur within desert dry wash woodland, unvegetated washes, and Sonoran creosote bush scrub habitats within the project area.
Bitter snakewood *Condalia globosa* var. *pubescens*	Another common name for this species is spiny abrojo. Bitter snakewood occurs in Sonoran desert scrub from approximately 400 feet to 3,000 feet above MSL. Bitter snakewood blooms from March through May (CNPS, 2009 as cited in the CEC RSA, 2010). Based on 35 records Consortium of California Herbaria database, all records are from Imperial County except one from Riverside County, a record from 1,900 feet elevation from a relatively flat alluvial fan from Chuckwalla Bench (CCH, 2010 as cited in the CEC RSA, 2010). There are no CNDDB records for this species for California (CNDDB, 2010 as cited in the CEC RSA, 2010).	This species was not observed during spring 2009 or 2010 field surveys. This species is a target plant species to be surveyed for during spring 2010 botanical surveys within the transmission line, substation, and associated road spurs. The Project site occurs below the elevation where this species typically occurs.
California ayenia *Ayenia compacta*	This species occurs in Mojavean and Sonoran desert scrub from approximately 500 to 3,300 feet above MSL. This species blooms from March through April. There are 29 records from the Consortium of California Herbaria database from the Anza-Borrego area alone, and one from Riverside County from a sandy wash in the Santa Rosa Mountains off Martinez Canyon (CCH, 2010 as cited in the CEC RSA, 2010). The nearest CNDDB occurrence is a historical record from 1776 approximately 30 miles southwest of the Project Area in the Chuckwalla Mountains (CNDDB, 2010 as cited in the CEC RSA, 2010).	This species was not observed during spring 2009 or 2010 field surveys. This species is a target plant species to be surveyed for during spring 2010 botanical surveys within the transmission line, substation, and associated road spurs. This species has a potential to occur within Sonoran creosote bush scrub and desert wash habitats within the project area.

TABLE 3.18-3 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Plants (cont.)		
California ditaxis *Ditaxis serrata* var. *californica*	This species occupies Sonoran desert scrub and has been reported as occurring from San Bernardino, Riverside, Imperial, San Diego, and Sonora, Mexico (CNPS, 2009 as cited in the CEC RSA, 2010) from approximately 100 to 3,000 feet above MSL. There are 23 records from the Consortium of California Herbaria database primarily from Riverside County from sandy, open alluvial fans.	California ditaxis has a low potential to occur within the Study Area due to the presence of suitable habitat and records from the Chuckwalla Valley and Desert Center areas. This species was not observed during spring 2009 field surveys.
California satintail *Imperata brevifolia*	This species occurs in grassy areas found near chaparral, desert scrub, riparian scrubs, coastal scrub, wet springs, meadows, stream sides and floodplains from sea level to approximately 1,500 feet above MSL. There are 64 records from the Consortium of California Herbaria database from many northern and southern California counties. Records from Riverside County are from the Palm Springs and San Jacinto Mountains area along irrigation ditches or streams.	California satintail has a low potential to occur within the Study Area due to the presence of suitable habitat although lack of occurrences from the project area. This species was not observed during spring 2009 field surveys.
Chaparral sand verbena *Abronia villosa* var. *aurita*	This species occupies sandy soil areas of chaparral, coastal sage scrub, and sandy desert dunes (CNPS, 2009 as cited in the CEC RSA, 2010) from approximately 240 feet to approximately 4,800 feet above MSL. There are 147 records in the Consortium of California Herbaria database, many of which are from Riverside County in the San Jacinto Mountains area.	Chaparral sand verbena has a low potential to occur within the Study Area due to the presence of suitable habitat although lack of occurrences from the project area. This species was not observed during spring 2009 field surveys.
Coachella Valley milkvetch *Astragalus lentiginosus* var. *coachellae*	The Coachella Valley Multiple Species Habitat Conservation Plan states that this species occurs on “dunes and sandy flats, along the disturbed margins of sandy washes, and in sandy soils along roadsides and in areas formerly occupied by undisturbed sand dunes. Within the sand dunes and sand fields, this milkvetch tends to occur in the coarser sands at the margins of dunes, not in the most active blowsand areas. As this species is strongly affiliated with sandy substrates, it may occur in localized pockets where sand has been deposited by wind or by active washes. It may also occur in sandy substrates in creosote bush scrub, not directly associated with sand dune habitat (CVAG, 2007 as cited in the CEC RSA, 2010). This plant species blooms from February to May, producing pink to deep magenta-colored flowers. This species occurs on aeolian deposits with fewer than 25 occurrences in the Coachella Valley. Coachella Valley milkvetch depends on natural disturbances from fluvial and aeolian processes for seedling establishment (BLM, 2002).	This species was not observed during spring 2009 surveys and does not have a potential to occur in the Study Area. This species is not expected to occur in the project area. The distribution of Coachella Valley milkvetch is restricted to the Coachella Valley in Riverside County, between Cabazon and Indio. CVAG (2007 as cited in the CEC RSA, 2010) identifies six outlying occurrences within a 5-mile area along Rice Road in the Chuckwalla Valley north of Desert Center, California (CVAG, 2007 as cited in the CEC RSA, 2010); however, USFWS staff has indicated that these occurrences are not of the listed taxon (Engelhard, per. comm. as cited in the CEC RSA, 2010).
Cove’s cassia *Senna covesii*	This species occurs on dry, sandy desert washes and slopes of the Sonoran Desert between 1,600 to 2,000 feet above MSL. This species occurs in sandy washes, roadsides, alkaline flats in the Mojave Desert and northern Sonoran Desert between 1,600 to 2,000 feet above MSL (CNPS, 2009 as cited in the CEC RSA, 2010).	Cove’s cassia has a low potential to occur within the Study Area due to the presence of suitable habitat and the project site being located below the typical elevation range where this species is known from. This species was not observed during spring 2009 field surveys.
Crucifixion thorn *Castela emoryi*	This species occurs in Sonoran Desert and Mojavean Desert in scrub and playas with dry, gravelly washes, slopes, and plains from approximately 300 to 2,100 feet above MSL. There are 64 records in the Consortium of California Herbaria database from Riverside, San Bernardino, Imperial Counties among others and often times prefers grassy or hayfield habitats. There is a record from a hayfield in Chuckwalla Valley.	This species has a low potential to occur within the Study Area due to the presence of suitable habitat and appropriate elevation range of the project site. This species was not observed during spring 2009 field surveys.

TABLE 3.18-3 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Plants (cont.)		
Desert portulaca *Portulaca hamiloides*	This species occurs in Joshua tree woodlands and has been reported from Riverside, San Bernardino, and portions of Arizona and Baja, California from 3,000 feet to 3,600 feet above MSL (CNPS, 2009 as cited in the CEC RSA, 2010).	This species is not expected to occur within the Study Area due to lack of typical habitat associations and the project site being located outside of the elevation range. This species was not observed during spring 2009 field surveys.
Desert sand parsley *Ammoselinum giganteum*	This species occupies Sonoran creosote bush scrub and has been reported from Riverside County, California and portions of Arizona (CNPS, 2009 as cited in the CEC RSA, 2010) at approximately 1,200 feet elevation. There are 2 records from the Consortium of California Herbaria database from Riverside County from the Chuckwalla Valley where this species was observed growing in dry basins at 500 feet above MSL (CCH, 2010 as cited in the CEC RSA, 2010).	Desert sand parsley has a low potential to occur within the Study Area due to presence of suitable habitat and reported occurrences from the Chuckwalla Valley. This species was not observed during spring 2009 field surveys.
Desert spike moss *Selaginella eremophila*	This is a dense, mat forming, non-flowering plant. This species occurs in Sonoran creosote bush scrub in gravelly or rocky soils from approximately 600 to 2,700 feet above MSL. There are 56 records in the Consortium of California Herbaria database from Riverside and San Diego Counties with several records from Anza-Borrego Desert State Park, Palm Springs, Palm Canyon, and San Jacinto Mountain Range. One collection from Riverside County is from the vicinity of the Chocolate-Chuckwalla Mountain region near the north side of the Orocopia Mountains from sloped rocky, shady surfaces in gravelly soils (CCH, 2010 as cited in the CEC RSA, 2010).	This species was not observed during spring 2009 field surveys. This species has a low potential to occur within the Study Area give the presence of suitable desert scrub habitat and historic collections from the project area, although the project site is located below the typical elevation range of this species.
Dwarf germander *Teucrium cubense* ssp. *depressum*	This species occurs in desert dune, playa margins, and Sonoran desert scrub from approximately 100 feet to 1,200 feet above MSL. This species typically blooms from March to May but may also bloom from September through November. This species typically occurs in sandy soils and wash habitats and is known from fewer than 10 occurrences in California (CNPS, 2009 as cited in the CEC RSA, 2010). There are 15 records from Consortium of California Herbaria database from Riverside and Imperial Counties; there are records from the Chuckwalla Valley in the Hayfield area and Palo Verde Valley. There is a CNDDB record from Wiley's Well Road (400 feet elevation) during 1979 (CNDDB, 2010 as cited in the CEC RSA, 2010). Another CNDDB occurrence is a historical record from 1912 located approximately 7 miles southeast of the project area from the Palo Verde Valley (CNDDB, 2010 as cited in the CEC RSA, 2010).	This species has a low potential to occur due to the presence of suitable habitat and appropriate elevation range of the site. This species was not observed during spring 2009 field surveys.
Foxtail cactus *Coryphantha alversonii*	This species occurs on rocky, granitic soils in Sonoran and Mojavean desert scrub from 200 feet to 4,600 feet above MSL. Prior to conducting spring 2009 field surveys, a reference population was observed on April 9, 2009 at a gravel pit northwest of Blythe along State Route 95 and several individuals were observed in relatively undisturbed Sonoran creosote bush scrub on granitic rock, a preferred habitat type of this species (CNPS, 2009 as cited in the CEC RSA, 2010). This species was not found during surveys performed in the Study Area. There are 25 records of this species from the Consortium of California Herbaria database from Riverside, Imperial, and San Bernardino Counties. There are records from the Chuckwalla Valley from rocky, granitic slopes (CCH, 2010 as cited in the CEC RSA, 2010).	Foxtail cactus has a low potential to occur within the Study Area due to the presence of suitable desert scrub habitat and appropriate elevation of the site although lack of rocky, granitic soils. This species was not observed during spring 2009 field surveys.

TABLE 3.18-3 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Plants (cont.)		
Mesquite nest straw *Stylocline sonorensis*	This species occupies Sonoran desert scrub around 1,300 feet elevation and has been reported from Riverside County and portions of Arizona and Sonora, Mexico (CNPS, 2009 as cited in the CEC RSA, 2010). There are 2 records from the Consortium of California Herbaria database from Riverside County both from the Chuckwalla Mountains, Hayfields region from 1930 (CCH, 2010 as cited in the CEC RSA, 2010).	This species was not observed during spring 2009 field surveys. Mesquite nest straw has a low potential to occur within the Study Area due to suitable habitat present within the project site.
Orocopia sage *Salvia greatae*	This species occurs in the southeastern Sonoran Desert and is associated with the Orocopia and Chocolate Mountains on alluvial slopes between 100 and 800 feet above MSL. There are 49 records from the Consortium of California Herbaria database several from the Chocolate, Chuckwalla, and Orocopia mountain areas (CCH, 2010 as cited in the CEC RSA, 2010).	This species was not observed during spring 2009 field surveys. This species has a low potential to occur within the Study Area due to the presence of suitable habitat and appropriate elevation range of the site.
Pink fairyduster *Calliandra eriophylla*	This species occurs in the Sonoran Desert in sandy washes, slopes and mesas from 350 to 5,000 feet above MSL. There are 62 records from the Consortium of California Herbaria database several from the Chocolate-Chuckwalla Mountains area in Imperial and San Diego Counties (CCH, 2010 as cited in the CEC RSA, 2010).	This species was not observed during spring 2009 field surveys. Pink fairy duster has a low potential to occur within the Study Area due to suitable habitats, appropriate elevation range of the site, and reported records from the project area.
Pink velvet mallow *Horsfordia alata*	This species occurs in the Sonoran Desert in California, Arizona, and Mexico. It occurs in Sonoran desert scrub from approximately 300 to 1,500 feet above MSL. There are no CNDDB records for this species for the entire state of California; the most recent collections have been from the Chocolate, Chuckwalla, and Cargo Muchacho Mountains approximately 50 miles south of the Study Area and are believed to be extant.	This species was not observed during Spring 2009 field surveys.
Sand evening-primrose *Camissonia arenaria*	This species occupies sandy and gravelly areas of Sonoran desert scrub and has been reported from Imperial and Riverside Counties and areas of Arizona and Mexico from 200 feet to 2,700 feet above MSL (CNPS, 2009). There are 13 records of this species in the Consortium of California Herbaria database several from the Chocolate-Chuckwalla Mountains, Palo Verde Valley, and Ogilby Pass area (CCH, 2010 as cited in the CEC RSA, 2010).	This species has a low potential to occur within the Study Area due to the presence of suitable habitat and appropriate elevation of the site. This species was not observed during spring 2009 field surveys.
Slender woolly-heads *Nemacaulis denudata* var. *gracilis*	This species occupies desert sand dunes, coastal dunes, and Sonoran desert scrub (CNPS, 2009 as cited in the CEC RSA, 2010) from 150 to 1,200 feet above MSL. There are 45 records in the Consortium of California Herbaria database from the Palm Springs, Indian Wells area in Riverside County (CCH, 2010 as cited in the CEC RSA, 2010).	Slender woolly-heads has a low potential to occur within the Study Area due to suitable habitat and appropriate elevation range of the site. This species was not observed during spring 2009 field surveys.
Small-flowered androstephium *Androstephium breviflorum*	This species occurs in desert dune and Mojavean desert scrub from approximately 700 feet to 2,000 feet above MSL (CNPS, 2009 as cited in the CEC RSA, 2010). This species blooms from March through April and often occurs on desert bajadas. The nearest CNDDB record for this species is from Cadiz Valley from Riverside and San Bernardino Counties approximately one mile north of Highway 62 during 1995 from a sandy, Mojavean Desert shrub-land bajada (CNDDB, 2010 as cited in the CEC RSA, 2010).	This species has a potential to occur within the site due to suitable sand dune habitat and appropriate elevation range of the site. This species was not observed during 2009 field surveys, nor was it found during 2010 botanical surveys.

TABLE 3.18-3 (Continued)
SPECIAL-STATUS PLANT SPECIES WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Plants (cont.)		
Spearleaf *Matelea parvifolia*	This species occurs in Mojavean and Sonoran desert scrub from 1,320 feet to approximately 3,300 feet above MSL. This species blooms from March through May (CNPS, 2009). The nearest CNDDB record for this species is from the Chuckwalla Bench area during 1986 from desert dry wash woodland and creosote bush scrub habitats (CNDDB, 2010 as cited in the CEC RSA, 2010).	This species has a potential to occur within the Project Disturbance Area although was not observed during spring 2009 field surveys. The site is located below the typical elevation range of this species. This species was a target plant species during spring 2010 botanical surveys within the transmission line, substation, and associated road spurs. No plants were found.
Wiggins' cholla *Cylindropuntia wigginsii*	Wiggins' cholla is not recognized as a species, but is considered a hybrid of silver cholla (*C. echinocarpa*) and pencil cholla (*C. ramosissima*). Wiggins' cholla is not found as a separate species in The Jepson Manual (1993) nor in Munz et al A California Flora and Supplement (1973); however, the BLM's Proposed Northern and Eastern Colorado Desert Coordinated Management Plan identifies Wiggins' cholla as a special-status species (BLM, 2002). The CNPS recognizes Wiggins' cholla as a CNPS List 3.3 species meaning more information is needed about this species and is not considered very endangered in California and also considers this species a sporadic hybrid of the two Cylindropuntia species mentioned above (CNPS, 2009 as cited in the CEC RSA, 2010).	Wiggins' cholla is not expected to occur in the project area.

The revised delineation also included waters associated with the proposed new substation south of I-10 and the interconnecting transmission line. However, the impacts and mitigation measures associated with the substation are the responsibility of Southern California Edison, not the Applicant. The acreages itemized above include features that cross the interconnecting transmission line alignment but do not include waters contained within the footprint of the proposed substation (AECOM, 2010a as cited in the CEC RSA, 2010).

Hydrology

The affected waters occur within the Chuckwalla-Palen hydrologic unit, or “watershed” of the Colorado River Hydrologic Basin Planning Area (Galati & Blek, 2010a). The rainfall pattern is bimodal with a rainy season in both summer and winter (December through March and July through September [commonly the wetter of the two]). Average annual rainfall for the project area is approximately 3.7 inches (NOAA, 2009 as cited in the CEC RSA, 2010).

In arid fluvial systems, it is the flash flood events (particularly the larger summer thunderstorms), combined with the highly erosive soils of alluvial fans that most contribute to the conversion from single thread channels to a compound or anastomosing (braided) morphology. Because the ephemeral washes occurring within the disturbance area are subject to very wide fluctuations in discharges over a short period of time their channels can change configuration frequently to accommodate large variations in surface flow during storm events. As a result, arid fluvial systems usually exhibit long periods of little morphologic change interspersed with short-term dramatic changes in channel configuration. Therefore, arid stream geometry is more likely to be influenced strongly by a large event of low recurrence frequency (Lichvar et al., 2006 as cited in the CEC RSA, 2010).

Surface hydrology in the project area is influenced largely by stormwater runoff off the northeastern flank of the Chuckwalla Mountains, approximately 4 miles south, and south of I-10 (Galati & Blek, 2010a as cited in the CEC RSA, 2010). The main hydrologic feature in the watershed, and in the project area, is Corn Springs Wash, which is supported largely by precipitation but also in part by Corn Springs. The stream drains approximately 31 square miles of the Chuckwalla Mountains at higher elevations (AECOM, 2009a as cited in the CEC RSA, 2010). Corn Springs Wash and all other desert washes in the watershed are ephemeral (flowing only in response to storm events). At the foot of the Chuckwalla Mountains, as Corn Springs Wash and other features empty onto the alluvial fan of more erosive, less consolidated soils, the stream system changes from single thread channel to compound, anastamosing channels with highly variable flow pathways. Compound channels are considered the most common channel types in arid regions and are characterized by low-flow meandering channels inset into a wider braided channel network (Lichvar et al., 2006 as cited in the CEC RSA, 2010). These channels are highly susceptible to widening and avulsions (i.e., rapid changes in channel position and/or channel relocation) during moderate to high discharges, reestablishing a low-flow channel during subsequent low flows (Lichvar and McColley, 2008 as cited in the CEC RSA, 2010). This channel avulsion creates diverse physical features and habitats, supports a complex ecosystem, and sustains healthy stream function despite frequent and rapid changes in channel position (USACE, 2007 as cited in the CEC RSA, 2010). With any compound/anastomosing ephemeral stream system in arid regions, the riparian corridor may consist of streambanks lined with adapted riparian vegetation, unvegetated areas such as recently created swales and terraces (interfluves), or a mosaic of these types (Bendix and Hupp, 2000 as cited in the CEC RSA, 2010).

Historic Hydrologic Alterations

When I-10 was constructed across the alluvial fan outlet of Corn Springs Wash over 40 years ago, it deprived the downstream reaches of all surface flows, interrupted natural channel formation and meandering nature of the alluvial fan flow path(s) that historically drained unimpeded from the Chuckwalla Mountains and toward Palen Dry Lake, a playa lake (depressional desert sink) (Galati & Blek, 2010a as cited in the CEC RSA, 2010). A series of wing dikes were constructed just upstream (south) of the freeway, diverting the flows of numerous smaller channels into the three largest branches of Corn Springs Wash, which I-10 crosses with three short bridge spans. These dikes and bridges along I-10 concentrate the flows of dozens of small washes into three discrete discharge points. The westerly bridge near Corn Springs Road Interchange conveys flows from the main branch of Corn Springs Wash to the northwest corner of the site. The two other bridges convey flows to the center and east side of the project site respectively. The flat topography at the outlet of the culverts creates an initially incised watercourse, which rapidly diminishes and eventually spreads out into numerous small, newly formed channels that abate fairly quickly.

The elevated freeway permanently deprived flows of many of the channels that once crossed the project site; many dead and declining ironwood trees are still evident and there is a marked decrease in the cover, vigor, diversity, and overall habitat function and value in the impaired reaches on the site. This observation also is supported by comparisons of current and historical aerial photography of the project site (before and after the diversions) (Galati & Blek, 2010a as cited in the CEC RSA, 2010).

Function and Value of State Waters for Vegetation

The desert dry washes play an integral role in the ecology of the watershed. The ephemeral washes (both vegetated and unvegetated) provide unique habitat that is distinct from the surrounding uplands, providing more continuous vegetation cover and microtopographic diversity than the surrounding uplands, migration corridors, and refuge, for a variety of wildlife. Both the wash-dependent and upland vegetation along these washes drive food webs, and provide seeds for regeneration, habitat for wildlife, access to water when present, and create cooler, more hospitable microclimatic conditions essential for a number of plant and animal species. The vegetation—whether dominated by woodland trees or shrubs and perennial herbs—contributes channel roughness that reduces the velocity of floodwaters, and provides organic matter for soil development and nutrient cycling.

The desert dry wash woodland provides additional structural elements of food, cover, nesting and breeding habitat, and movement/migration corridors for wildlife that are quite distinct from the surrounding uplands of sparse creosote bush scrub and sandy plains. Functional services of these communities include moderating soil and air temperatures, stabilizing channel banks and interfluves, seed banking and trapping of silt and fine sediment favorable to the establishment of diverse floral and faunal species, and dissipating stream energy which aids in flood control (USEPA, 2008 as cited in the CEC RSA, 2010).

During seasonal dry periods, plant species diversity levels along ephemeral stream channels typically are low. Following seasonal wet periods, however, diversity levels along some ephemeral stream channels can equal that along perennial stream channels (Lichvar and McColley, 2008 as cited in the CEC RSA, 2010) with ephemeral desert annuals.

Because ephemeral and intermittent stream channels have a higher moisture content and more abundant vegetation than the surrounding areas, they are very important to wildlife. Frequently, these streams may retain the only available water in the area, with permanent pools interposed wherever hydrogeological conditions allow (USEPA, 2008 as cited in the CEC RSA, 2010). The short duration and episodic flood pulses of surface and overbank flow is important as it allows some species to complete important life-history developmental stages. The habitat provided by desert streams contracts and expands dramatically in size due to the extreme variations in flow, which can range from high-discharge floods to periods when surface flow is absent. This spatial variation in habitat or ecosystem size is a fundamental, defining feature of these streams (Smith et al., 1995 as cited in the CEC RSA, 2010; USEPA, 2008 as cited in the CEC RSA, 2010).

Within the survey area there was ample evidence of the presence of wildlife use of the ephemeral washes (e.g., tracks and scat) as a movement corridor (Solar Millennium, 2010a as cited in the CEC RSA, 2010). In addition to Sonoran creosote bush scrub, the desert dry wash woodland and unvegetated ephemeral dry wash communities within the Survey Area are considered suitable burrowing owl foraging and nesting habitat. Desert tortoise will be present in higher densities associated with drainages, swales, mountainous areas and alluvial fans. Annual and perennial plant production is higher in these areas and is longer lasting. Ephemeral streams also contain rich assemblages of both invertebrates and macro-invertebrates (USEPA, 2008 as cited in the CEC RSA, 2010).

3.18.6 Sand Dune Transport System

This subsection provides a brief explanation of wind transport of sand relative to the creation, preservation and destruction of sand dunes in the project area. Soil & Water Appendix A of the CEC RSA provides a more detailed explanation (CEC RSA, 2010), as does the Applicant’s Preliminary Geomorphic Aeolian and Ancient Lake Shoreline Report (Solar Millennium, 2010b as cited in the CEC RSA, 2010) and Biological Resources Appendix B in the RSA (CEC RSA, 2010, Appendix B).

The proposed footprint of the project covers several different land units that vary along a southwest to northeast gradient in the degree of aeolian sand transport they experience. The least sandy land unit is within the project’s western solar array, which is almost entirely a stable, coarse gravel alluvial fan surface (referred to as Zone IV in Solar Millennium, 2010b as cited in the CEC RSA, 2010). The sand dunes in the southern and western sector of the site are a mixture of degraded vegetated dunes with thin coarse sand, and patches of alluvial gravel lag and desert varnish. This surface has been formed primarily by deposition of sand and gravel from alluvial fans (fluvial action) over hundreds of thousands of years, overlain with patches of vegetated sand dunes that formed from wind action during periods of greater sand availability. The sand dunes on the mid fan have subsequently degraded due to wind erosion and deflation (sand is being removed by the wind but not replaced). Deflation of the relict dunes is leaving behind the more resistant alluvial deposits as a protective lag of gravel. In many places the lag has formed desert varnish (a black coloration on the exposed surface of gravel particles). The presence of desert varnish suggests that parts of this surface have been stable and exposed in its current condition for many hundreds to thousands of years. There is little available sand for either transport to dunes down wind, and the sand that is present is coarse (1-2 mm) with abundant fine gravel (2 mm and larger). The vegetation cover is largely sparse creosote bushes with ironwood trees in the larger washes.

The northeast dune area is a more active wind-blown sand area with relatively shallow sand deposits (Zone III) on the lower alluvial fan. This is an area of shallow vegetated sand dunes with a transition from creosote bushes to grasses. The dunes are in relative equilibrium – losses of sand due to wind erosion are matched by deposition of sand from upwind.

At the northeastern portion of the project site within the lower alluvial fan is an area of deeper and more active vegetated sand dunes (Zone II). This area is characterized by hummocky vegetated dunes with greater topographic expression than the zone to the west, implying that they are more actively supplied by sand. This zone lies within the Palen Dry Lake – Chuckwalla sand transport corridor, a regionally significant geomorphic feature that provides sand build and support sand dune habitat. This sand corridor stretches down the Chuckwalla Valley to Blythe and the Colorado River.

The most active area of sand transport is Zone 1, northeast of the project boundary. Two sand transport corridors come together just to the east of the project: the Palen Valley corridor which runs from north to south along the eastern edge of the project and the Palen Dry Lake – Chuckwalla Valley corridor which runs northwest to southeast through the northeastern half of the project.

3.18.7 Invasive and Noxious Weeds

Noxious and invasive weeds are species of non-native (exotic) plants included on the weed lists of the California Department of Food and Agriculture (CDFA) (CDFA, 2007 as cited in the CEC RSA, 2010), the California Invasive Plant Council (Cal-IPC), or those weeds of special concern identified by the BLM. They are of particular concern in wild lands because of their potential to degrade habitat and disrupt the ecological functions of an area (Cal-IPC, 2006 as cited in the CEC RSA, 2010). Specifically, can alter habitat structure, increase fire frequency and intensity, decrease forage (including for special-status species, such as desert tortoise), exclude native plants, and decrease water availability for both naive plants and wildlife. Soil disturbance and channeling water create conditions favorable to the introduction of new invasive weeds or the spread of existing populations. Construction equipment, fill material, and mulch can act as vectors in introducing invasive exotic plant seeds and propagules into an area.

Non-native plant species recorded as a part of project surveys are located especially in the southern portion of the Study Area, they are: Sahara mustard, Russian thistle, Saltcedar, and Mediterranean grass. Each of these species is identified on a list of the region's worst weeds compiled by the Natural Resource Conservation Service for the Low Desert Weed Management Area (NRCS, 2005 as cited in the CEC RSA, 2010).

Sahara Mustard

Sahara mustard (*Brassica tournefortii*), also called African mustard, was found in disturbed areas throughout Sonoran creosote bush scrub habitat (Solar Millennium 2009a, Appendix F). This species is a BLM weed of special concern, Cal-IPC has declared this plant highly invasive (Cal-IPC, 2006 as cited in the CEC RSA, 2010) and recommends that it should be eradicated whenever encountered. This species is associated with impacts to habitat for native wildlife as well as for native plants. It promotes the spread of fire by increasing fuel load and competes with native plants for moisture and nutrients. In addition, it increases cover and works to stabilize sand, thereby affecting wildlife species dependent on open sandy habitat (Brossard et al., 2000 as cited in the CEC RSA, 2010; Barrows and Allen, 2007 as cited in the CEC RSA, 2010).

Russian Thistle

Russian thistle (*Salsola* sp.), also called tumbleweed, was found in several habitat types in the Project Disturbance Area, including dune, desert scrub, desert dry wash woodland, and Sonoran creosote bush scrub (Solar Millennium, 2009a, Appendix F). Although all invasive plants share the trait of being adapted to disturbed habitat, Russian thistle particularly tends to be restricted to roadway shoulders and other sites where the soil has been recently disturbed (CEC RSA, 2010). However, once an area is disturbed this species competes readily and can affect native plant ecosystems and increase fire hazard (Orloff et al., 2008 as cited in the CEC RSA, 2010; Lovich, 1999 as cited in the CEC RSA, 2010). Dune habitat is particularly vulnerable to non-native species, which can stabilize sand or block sand movement, and Russian thistle is considered an invasive species of primary concern in this habitat (CDFG, 2007 as cited in the CEC RSA, 2010). There is a high potential that Russian thistle could become established in the construction area and should be eradicated if observed. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC, 2006 as cited in the CEC RSA, 2010) and the California Department of Food and Agriculture (CDFA) has given it a "C" rating. A C rating means that the pest is of known economic or environmental detriment and, if present in California, it is usually widespread. If found in the State, C-rated species are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no State-enforced action other than providing for pest cleanliness.

Tamarisk or Saltcedar

Tamarisk or Saltcedar (*Tamarix ramosissima*) is restricted to habitats where there is perennial saturation such as springs and seeps, or runoff from poorly maintained water pipelines or well pumps. It was observed interspersed throughout desert dry wash woodland within the Study Area. Cal-IPC has declared this plant highly invasive (Cal-IPC, 2006 as cited in the CEC RSA, 2010) and it is a CDFA "B" rated species, meaning it is a pest of known economic or environmental detriment and, if present in California, it is of limited distribution. If found in the State, B-rated species are subject to State-endorsed holding action and eradication only to provide for containment, as when found in a nursery. At the discretion of the individual county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action. Saltcedar is associated with many ecological impacts including impacts to channel geomorphology, groundwater availability, plant species diversity, and fire frequency (Lovich, 1999 as cited in the CEC RSA, 2010). Saltcedar also can affect sand dunes by blocking sand movement, a vital part of the natural function of these habitats (CDFG, 2007 as cited in the CEC RSA, 2010).

Mediterranean grass

Mediterranean grass (*Schismus* spp.) is prevalent throughout Sonoran creosote bush scrub within the Study Area. Mediterranean grass is an annual that reproduces by seed, and is widespread in arid and semi-arid California landscapes. This species competes effectively with native plants for nutrients and water and can provide cover that prevents native annuals from sprouting (VanDevender et al., 1997 as cited in the CEC RSA, 2010; Brossard et al., 2000 as cited in the CEC RSA, 2010) and contributes to dune stabilization (CDFG, 2007 as cited in the CEC RSA, 2010). Fire, historically, was rare in the Colorado Desert. The presence of Mediterranean grass and other annual non-native grasses has provided a continuous and increased fuel load, influencing the extent, frequency, and intensity of fire in these ecosystems (Brooks and Pyke, 2001 as cited in the CEC RSA, 2010; Brooks et al., 2004 as cited in the CEC RSA, 2010). BLM and other agencies recognize that because of the widespread distribution of Mediterranean grass, this species is not considered feasible to eradicate. The USDA has not approved any fungi or invertebrate species to control Schismus spp.

Cacti, Yucca, and Native Trees

The 2009 and 2010 surveys also included an inventory of native cacti, succulents and native trees that are not considered rare (e.g., they are not tracked by CNDDB or included on the CNPS special-status plant lists) but the harvesting of these native plants is regulated under the California Native Plant Protection Act (Fish and Game Codes 1900-1913) and the California Desert Native Plant Act of 1981 (Food and Agricultural Code § 80001 et. seq.; Fish & Game Code §§ 1925-1926), which prohibit unlawful harvesting of non-listed native desert plants of the state (see, CEC RSA, 2010; Biological Resources Table 1).

During 2009 and at the request of the BLM, the Applicant conducted sampling plots for cacti, yucca, and native trees in the study area primarily to search for and map any locations of California barrel cactus, cottontop cactus, or hedgehog cactus for future salvage when construction begins (Solar Millennium 2009a, Appendix F Biological Resources Technical Report as cited in the CEC RSA, 2010). None of these species were observed in the study area during spring 2009; however, a total of four species in the Cactaceae family were observed during 2009 field surveys, including teddybear cholla (*Cylindropuntia bigelovii*), silver cholla (*C. echinocarpa*), pencil cholla (*C. ramosissima*), and common fishhook cactus (*Mammilaria tetrancistra*). Additionally, native trees that were found during 2009 field surveys including smoke tree (*Psorothamnus spinosus*), ironwood (*Olneya tesota*), blue palo verde (*Parkinsonia florida*), ocotillo (*Fouquieria splendens ssp. splendens*), and honey mesquite (*Prosopsis glandulosa var. torreyana*). Additional mapping of cacti species was performed during 2010, and California barrel cacti (*Ferocactus cyylindraceus*), cottontop cactus (*Echinocactus polycephalus*), and hedgehog cactus, *(Echinocactus engelmannii*) were found. A single location with five barrel cacti was observed within the buffer study area and south of I-10, and a single location of cottontop cactus was found in the eastern portion of the Project Disturbance Area (Solar Millennium 2010m, Table 3 and Figure 7 as cited in the CEC RSA, 2010).

3.19 Visual Resources

This chapter describes the project study area in terms of its existing value as a visual resource, and describes the applicable regulatory framework for managing and protecting scenic values. Following a brief description of the characteristics and extent of the study area, this section focuses on determining the extent and quality of visual resources in the study area by referencing existing inventory efforts that use the methodology outlined in BLM's Visual Resource Management (VRM) Program.

3.19.1 Project Study Area

The project site is located in the Mojave Desert geomorphic province of California, also referred to as the Sonoran Desert section of the Basin and Range physiographic region of the United States.[1] This region is characterized as a broad interior region of isolated mountain ranges separated by expanses of internally-drained desert plains. The plains are mantled by scattered patchworks of Sonoran creosote bush and dissected by dry desert washes which terminate at dry lakes. Figure 3.19-1 provides a view of the project area, as seen from a dirt road immediately north of I-10. In the photo, the project would be located in the immediate foreground, and would extend into the middleground of the photo occupied by the dry lake bed. Figure 3.19-2 provides a number of context photographs illustrating common visual features of the desert environment, and the characteristic landscape of the Chuckwalla Valley area.

The project study area is defined as all land areas from which any element of the project would be visible (i.e., the project's viewshed). The project viewshed is shown in Figure 3.19-3, and was generated via computer-generated viewshed tools. Distance zones in the figure provide a reference to approximate the prominence of the project in views. Based on BLM guidance (BLM Handbook H-8410), the outer extent of the background visibility zone is a radius 15 miles away from the outer edges of the project footprint. Beyond 15 miles is considered the "seldom seen" zone. Beyond this distance the project may be visible, although it would constitute a distant and minor element in views and would likely disappear into the horizon line, or be hidden by atmospheric conditions (e.g., haze or dust) and intervening topography. The 15-mile viewshed of the project would occupy 17,149 acres of the Chuckwalla Mountains Wilderness (or about 19 percent of the wilderness area), 5,938 acres of the Little Chuckwalla Mountains Wilderness (or about 20 percent of the wilderness area), 46,619 acres of the Palen/McCoy Wilderness (or about 21 percent of the wilderness area), and 6,707 acres of the Joshua Tree National Park (JTNP) (or less than one percent of the park area).

Some of the more distinct visual features located within the project study area include:

1. Several prominent mountain ranges to the northwest, northeast, and southwest, including the Palen, Chuckwalla, and Coxcomb Mountains, respectively.

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[1] California's geomorphic provinces and the physiographic regions of the U.S. are naturally defined geologic regions that display a distinct landscape or landform. These divisions are based on unique, defining features such as geology, topographic relief, climate, and vegetation. The distinction between California's geomorphic provinces and the physiographic regions of the U.S. is in the scale at which they are defined.

2. Palen Dry Lake and Sand Dunes, immediately west, north, and northeast of the project site.

3. Transmission lines paralleling both the north and south sides of I-10, and several unpaved 4WD/OHV roads.

4. The Community of Desert Center (visual features are increased signage, landscaped trees, and scattered buildings/structures).

The project is likely to be visible from isolated residences in Desert Center, which is the only residential community within viewing distance of the project area. The primary user groups that could have views of the project would be motorists along I-10 and SR 177; visitors to the Desert Lily Preserve and the Palen Dry Lake area, which are located north of the project site; motorists accessing the Corn Springs Campground and Chuckwalla Mountains Wilderness via Chuckwalla Valley and Corn Springs Roads; and dispersed recreational users in the surrounding wilderness areas. The Palen McCoy Wilderness is immediately northeast of the project, but the area with views of the project is not used for recreation and features neither trails nor trailheads (CEC Genesis RSA, 2010). However, since the wilderness area is physically accessible, it may also be visited on rare occasions by backcountry hikers. The portion of Joshua Tree National Park where the project could be visible does not contain visitor-serving facilities such as hiking trails, campgrounds or picnic areas—these occur in the central and western portions of the park, in areas located over 15 miles east of the project site that are unlikely to have views of project. However, the project could be visible from elevated vantage points within the Coxcomb Mountains, which is the eastern-most part of the park.

3.19.2 BLM Visual Resource Management (VRM) Policy

BLM's Visual Resource Management Policy is the agency's implementation of legal requirements for managing scenic resources, established through NEPA (1969) and FLPMA (1976). Under FLPMA, BLM has developed and applied a standard visual assessment methodology to inventory and manage scenic values on lands under its jurisdiction. The BLM manual M-8400-Visual Resource Management, Handbook H-8410-Visual Resource Inventory, and Handbook H-8431-Visual Resource Contrast Rating, set forth the policies and procedures for determining visual resource values, establishing management objectives, and evaluating proposed actions for conformance to the established objectives for BLM administered public lands. The following describes the three primary elements of the BLM's VRM Policy.

Determining Visual Resource Values

The primary means to establish visual resource values are to conduct a Visual Resource Inventory (VRI), as described in BLM Handbook H-8410. There are four VRI Classes (I to IV) assigned as a representation of the relative visual value. VRI Class I has the highest value and VRI Class IV has the lowest. VRI Class I is reserved for special congressional designations or administrative decisions such as Wilderness Areas, visually sensitive ACECs, or Wild and Scenic Rivers, etc. VRI Classes II through IV are determined through a systematic process that documents the landscape's scenic quality, public sensitivity and visibility. Rating units for each of the three factors are mapped individually, evaluated, and then combined through an over-layering analysis. The three considerations are briefly described below.

> *Scenic Quality*: Scenic Quality Rating Units (SQRUs) are delineated based on common characteristics of the landscape. There are seven criteria used for inventorying the landscape's scenic quality within each SQRU: landform, vegetation, water, color, influence of adjacent scenery, scarcity, and degree of cultural modification. Each factor is scored for its respective contribution to the scenic quality, the scores are summed, and the unit is given a rating of A (highest), B, or C (lowest) based on the final score.
>
> *Sensitivity Level*: Sensitivity Level Rating Units (SLRU) are delineated and evaluated for public sensitivity to landscape change. Criteria used for determining level of sensitivity within each unit includes types of use, amount of use, public interest, adjacent land uses, special areas, and other factors. Each criterion is ranked high, medium, or low and an overall sensitivity level rating then is assigned to the unit.
>
> *Distance Zones (visibility)*: The third factor is visibility of the landscape evaluated from where people commonly view the landscape. The distance zones are divided into foreground/middleground (three to five miles); background (five to 15 miles); and seldom seen (beyond 15 miles or topographically concealed areas within the closer range distance zones).

The relationships between the rated values of scenic quality, sensitivity level, and visibility are cross-referenced with the Visual Resource Inventory Matrix to determine the Visual Resource Inventory (VRI) Class, as shown in Table 3.19-1. Visual resource inventory classes are informational in nature and provide the basis for considering visual values in the Resource Management Planning (RMP) process. They do not establish management direction and should not be used as a basis for constraining or encouraging surface disturbing activities. They are considered the baseline data for existing conditions.

TABLE 3.19-1
DETERMINING VISUAL RESOURCE INVENTORY CLASSES

		Sensitivity Level								
		High			**Medium**			**Low**		
Special Areas		I	I	I	I	I	I	I	I	I
Scenic Quality	A	II	II	II	II	II	II	II	II	II
	B	II	III	III/IV[a]	III	IV	IV	IV	IV	IV
	C	III	IV	IV	IV	IV	IV	IV	IV	IV
		Fg/mg	Bg	Ss	Fg/mg	Bg	Ss	Fg/mg	Bg	Ss
		Distance Zones								

[a] If adjacent area is Class III or lower assign Class III, if higher assign Class IV

Fg/mg=Foreground/Middleground
Bg=Background
Ss=Seldom seen

SOURCE: BLM Manual H-8410-1

Establishing Management Objectives

VRM Classes (defined in Table 3.19-2) are determined by considering both VRI Class designations (visual values) along with resource allocations or special management decisions made in the applicable RMP. Management objectives for each VRM Class set the level of visual change to the landscape that may be permitted for any surface-disturbing activity. The objective of VRM Class I is to preserve the character of the landscape, whereas VRM Class IV provides for activities that require major modification to the landscape. Thus, the allowable levels of visual change for VRM Classes I through IV are decreasingly restrictive.

TABLE 3.19-2
VISUAL RESOURCE MANAGEMENT CLASSES

VRM Class	Objective
Class I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention
Class II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape
Class III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape
Class IV	The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

VRI Classes are not intended to automatically become VRM class designations. Management classes are determined through careful analyses of other land uses and demands. The VRM classes are considered a land use plan decision that guides future land management actions and subsequent site-specific implementation decisions. VRM class designations are to be assigned to all BLM public land. VRM class designations may be different than the VRI classes assigned in the inventory and should reflect a balance between protection of visual values while meeting energy and other land use, or commodity needs. For example, an area with a VRI Class II designation may be assigned a VRM Class IV designation, based on its overriding value for mineral resource extraction or its designation as a utility corridor.

While the applicable RMP for the study area is the CDCA Plan, it does not contain a visual resource element, and has not established VRM Classes. When a project is proposed and there are no RMP-approved VRM objectives, Interim Visual Resource Management (IVRM) Classes must be established. These classes are developed using the process just described, but may be restricted in geographic scope to areas affected by the proposed action. If the area is also without a VRI, then one must be conducted in order to provide a baseline of data by which to analyze impacts and to inform appropriate designation of interim VRM Classes.

Evaluating Proposed Actions

Proposed plans of development are evaluated for conformance to the VRM Class objectives through the use of the Visual Resource Contrast Rating process set forth within BLM Handbook H-8431-1. Because this concerns the environmental consequences of the proposed action, this process is further described and applied in Chapter 4.18.

3.19.3 Visual Resource Inventory

The baseline mapping of landscape units in this assessment is derived from the visual resource inventory and subsequent Interim Visual Resource Management (IVRM) Classes developed in connection with the Devers-Palo Verde No. 2 Transmission Line EIR/EIS (DPV 2 EIR/EIS). In the baseline setting for that document, landscape units were delineated, assessed and rated following the BLM's Visual Resource Inventory (VRI) process. The applicable portions of that document, which include photographs and an evaluation of scenic quality factors is provided in Appendix J. The visual resource inventory mapping and evaluation reflects an assessment of the landscape's *scenic quality*, *viewer sensitivity*, and *distance zone* of observers. Based on these factors, the project site was assigned to VRI Class III, which represents a moderate visual value. The DPV 2 EIR/EIS inventory mapping and analysis of the area affected by the proposed action is incorporated herein by reference, and summarized briefly below.

Scenic Quality Rating

The project is located partly in Scenic Quality Rating Unit (SQRU) 10 and partly in SQRU 12, both of which represent the flat desert floor along the Chuckwalla Valley. The landform of the Chuckwalla Valley SQRU is flat and non-descript with grass and low-growing shrubs of subdued color. Though distant mountain ranges (e.g., the Palen Mountains to the north and the Chuckwalla Mountains to the south) provide backdrops of visual interest (not part of this unit), SQRU 10 and 12 are primarily influenced by the presence of existing utility infrastructure and I-10.

These landscape units are rated as C-Quality scenery, based on the combination of scores for landform, vegetation, water, color, adjacent scenery, scarcity and cultural modifications. The most influential factor in these units' low rating for scenic quality was the abundance of cultural modification along I-10 (roads, transmission lines, 4-wheel drive tracks, etc.) and the flatness and lack of visual variety in landform (although relatively high scores were assigned for adjacent scenery).

Sensitivity-Level Rating

The CDCA was designated by Congress in large part for its visual values and uniqueness in terms of being a fairly undisturbed portion of the California Desert close to large population centers. In recognition of this, VRM inventories within the California Desert Conservation Area (CDCA) have historically regarded the entire CDCA as having a high viewer sensitivity level (BLM, 1980). Thus, the project area is assigned a high visual sensitivity. This rating is a conservative assessment because public interest and special areas are only two of the five factors that influence the sensitivity level of a landscape unit. Types and amounts of use are typically also considered in the assessment of sensitivity which is generally low for the project area.

Distance Zone

The distance zone for all portions of the project is assigned to foreground/middleground (under five miles) due to the distance of I-10 and other local roads to the project (see Figure 3.19-3).

3.19.4 Interim Visual Resource Management Classes

As discussed above, VRM classes typically are assigned by the BLM through its RMPs; but in the case of the project, VRM classes were not established in the CDCA Plan. Instead, BLM land managers must establish "Interim VRM Classes" for each project on a case-by-case basis. The DPV 2 EIR/EIS determined Interim VRM Classes, which were mapped by the consultants and approved by the BLM. Therefore, those Interim VRM Classes will be used for the project. Figure 3.19-4 shows the Interim VRM Classes from the DPV2 EIR/EIS. The entire project site, including the areas encompassing the solar troughs, power blocks, and transmission line corridor, is classified as Interim VRM Class III. In the specific case of the Devers-Palo Verde No. 2 EIR/EIS, the Visual Resource Inventory (VRI) and Interim Visual Resource Management (IVRM) Class mapping were equivalent.

Thus, the project shall be managed in accordance with Interim VRM Class III objectives. The Interim VRM Class III management objective is reasonable because the project area is also under Multiple-Use Class M (Moderate Use), which is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. The objective of Interim VRM Class III is to partially retain the existing character of the landscape (see Table 3.19-2).

3.20 Water Resources

The project site is located between the communities of Blythe, California (approximately 35 miles southeast) and Desert Center, California (approximately 9 miles west). It is located in the Mojave Desert Geomorphic Province. The Mojave Desert is a broad interior region of isolated mountain ranges separated by expanses of desert plains. It has an interior enclosed drainage (i.e., there is no outlet to the ocean) and many dry lake beds known as *playas*. Physiographically, the site lies near the toe of alluvial fans emanating from the Chuckwalla Mountains to the south, the Coxcomb Mountains to the north, and the Palen Mountains to the northeast; it is bisected by a broad valley-axial drainage that extends southward between these mountains and drains to the Palen Lake playa located a short distance north of the site (Figure 3.20-1) (CEC/BLM, 2010). The elevation of Chuckwalla Valley ranges from under 400 feet above mean sea level (amsl) at Ford Dry Lake to approximately 1,800 feet amsl west of Desert Center and along the upper portions of the alluvial fans that ring the valley flanks. The surrounding mountains rise to approximately 3,000 and 5,000 feet amsl.

The ground surface in the vicinity of the site generally slopes gently downward to the northeast at an average gradient of 1.33 percent. Ground surface elevations at the site itself range from approximately 680 feet amsl in the southwest to 425 feet amsl in the northeast. Steeper grades are present at isolated sand dunes along the northern portion of the site. Toward the north and central portions of the site, the ground becomes hummocky as it transitions to the flat playa located along the northern portion of the site. On-site drainage is generally to the north (toward the Palen Dry Lake), and occurs in a number of alluvial channels and as unconfined flow (sheetflow) during larger storm events.

3.20.1 Climate and Precipitation

The climate in the Chuckwalla Valley is characterized by high aridity and low precipitation. The region experiences a wide variation in temperature, with very hot summer months with an average maximum temperature of 108 degrees Fahrenheit (ºF) in July and cold dry winters with an average minimum temperature of 66.7 ºF in December.

Average annual precipitation in the project area, based on the gauging station at Blythe Airport, is approximately 3.6 inches, with August recording the highest monthly average of 0.64 inches and June recording the lowest monthly average of 0.02 inches. Most rainfall occurs during the winter months or in association with summer tropical storms (which tend to be of shorter duration and higher intensity than winter storms). Tables 3.20-1 and 3.20-2 display the average monthly and annual minimum and maximum temperatures and precipitation from 1913 to 2008 collected from the Blythe Airport, located approximately 35 miles southeast of the project site. Per the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the Southern California area, 3.51 inches of rain fall in the 100-year, 24-hour storm event.

TABLE 3.20-1
CLIMATE TEMPERATURE DATA FOR BLYTHE AIRPORT, CALIFORNIA (1913-2008)

Month	Temperatures °F					Mean Number of Days			
	Monthly Averages			Record Extremes		Max. Temp.		Min. Temp.	
	Daily Max.	Daily Min.	Monthly	Record High	Record Low	90°F & Above	32°F & Below	32°F & Below	0°F & Below
Jan	66.7	41.5	54.1	89	20	0	0	2.7	0
Feb	72	45.4	58.7	93	22	0.2	0	0.8	0
Mar	78.4	50.2	64.3	100	30	3.1	0	0.1	0
Apr	86.4	56.5	71.5	107	38	11.6	0	0	0
May	95.2	64.4	79.8	114	43	23.8	0	0	0
Jun	104.5	72.7	88.6	123	46	29	0	0	0
Jul	108.4	81	94.7	123	62	30.9	0	0	0
Aug	106.6	80.2	93.4	120	62	30.6	0	0	0
Sep	101.3	73	87.2	121	51	28.4	0	0	0
Oct	89.8	60.9	75.3	111	27	17.6	0	0	0
Nov	75.8	48.6	62.2	95	27	0.8	0	0.1	0
Dec	66.7	41.2	53.9	87	24	0	0	1.8	0
Year	87.7	59.6	73.6	123	20	175.9	0	5.5	0

SOURCE: CEC RSA, 2010

TABLE 3.20-2
PRECIPITATION DATA FOR BLYTHE AIRPORT, CALIFORNIA (1913-2008)

Month	Rainfall (inches) [1913-2008]			
	Mean	Highest Month	Lowest Month	Highest Daily
Jan	0.47	2.48	0	1.64
Feb	0.44	3.03	0	1.66
Mar	0.36	2.15	0	1.52
Apr	0.16	3	0	2.67
May	0.02	0.22	0	0.22
Jun	0.02	0.91	0	0.91
Jul	0.24	2.44	0	1.4
Aug	0.64	5.92	0	3
Sep	0.37	2.14	0	1.9
Oct	0.27	1.89	0	1.61
Nov	0.2	1.84	0	1.04
Dec	0.39	3.33	0	1.42
Year[a]	3.59	—	—	3

NOTES:
[a] Totals may not match the data in specific columns due to rounding.

SOURCE: CEC RSA, 2010

Table 3.20-3 presents average monthly evapotranspiration rates for various stations located in the region.

TABLE 3.20-3
MONTHLY AVERAGE EVAPOTRANSPIRATION (ETO) RATES

Month	CIMIS Station #127	CIMIS Station #128	CIMIS Station #135	CIMIS Station #151	CIMIS Station #162	CIMIS Station #175	Regional
	Station: Salton Sea West	Station: Salton Sea East	Station: Blythe NE	Station: Ripley	Station: Indio	Station: Palo Verde II	
Jan (in/mo)	2.40	2.40	2.32	2.44	2.44	2.41	1.55
Feb (in/mo)	3.20	3.20	3.09	3.31	3.31	3.23	2.52
Mar (in/mo)	5.13	5.13	5.00	5.25	5.25	5.59	4.03
Apr (in/mo)	6.78	6.78	6.61	6.85	6.85	7.22	5.70
May (in/mo)	8.62	8.62	8.54	8.67	8.67	8.78	7.75
Jun (in/mo)	9.18	9.18	9.69	9.57	9.57	9.42	8.70
Jul (in/mo)	9.19	9.19	10.13	9.64	9.64	9.58	9.30
Aug (in/mo)	8.63	8.63	8.91	8.67	8.67	8.61	8.37
Sep (in/mo)	6.97	6.97	6.85	6.85	6.85	6.58	6.30
Oct (in/mo)	5.22	5.22	4.64	5.00	5.00	4.74	4.34
Nov (in/mo)	3.08	3.08	2.95	2.95	2.95	2.94	2.40
Dec (in/mo)	2.25	2.25	2.07	2.20	2.20	2.25	1.55
Year (in/yr)	70.65	70.65	70.8	71.4	71.4	71.35	62.50

NOTES: CIMIS monitoring station closest to project site are listed.
Regional evapotranspiration values correspond to CIMIS Reference ETo Zone 16, which includes Westside of San Joaquin Valley and Mountains East & West of Imperial Valley.

SOURCE: CEC RSA, 2010

3.20.2 Groundwater

The site is located within the Chuckwalla Valley Groundwater basin (CVGB; DWR Basin 7-5), which has a surface area of 940 mi^2 (2,435 km^2). The CVGB is bounded upgradient by two other groundwater basins that include the eastern part of the Orocopia Valley (DWR Basin No. 731) and Pinto Valley (DWR Basin No. 7-6) groundwater basins, and downgradient by the Palo Verde Mesa (DWR Basin No. 7-39) groundwater basin (PVMGB). The CVGB also connects to the southern tip of the Ward Valley groundwater basin (DWR Basin No. 7-03). The site location in relation to these features is shown on Figure 3.20-1 (CEC/BLM, 2010). The CVGB is bounded by the consolidated rocks of the surrounding mountains. Three water-bearing Quaternary- and Tertiary-age sedimentary units overlay non-water bearing bedrock in the CVGB (CEC RSA, 2010). DWR reports the maximum thickness of these deposits as about 1,200 feet (CEC RSA, 2010); however, modeling of Bouguer gravity data obtained from USGS suggest greater depths to bedrock exist in some parts of the basin (Figure 3.20-2) (CEC/BLM, 2010).

Groundwater Inflow/Outflow

Natural groundwater recharge to the CVGB includes recharge from precipitation and subsurface inflow from the Pinto Valley Groundwater Basin to the northwest and the Orocopia Valley Groundwater Basin to the Southwest (CEC RSA, 2010). Underflow from the Cadiz Valley Groundwater Basin has also been hypothesized by DWR; however, previous work has reportedly confirmed that the Cadiz Valley Groundwater Basin does not contribute inflow to the CVGB (CEC RSA, 2010). CVGB also shares a boundary with the Ward Valley Groundwater Basin, but groundwater is not reported to flow across this boundary (CEC RSA, 2010). Other sources of recharge to the basin include agricultural return flow and return flow from treated wastewater disposal.

In this part of California, almost all moisture from rain is lost through evaporation or evapotranspiration and runoff occurs principally during intense thunderstorms (CEC RSA, 2010). Most recharge from precipitation occurs when runoff from the surrounding mountains exits bedrock canyons and flows across the coarse sediments deposited in the proximal portions of the alluvial fans that ring Chuckwalla Valley. To a lesser extent, recharge occurs from infrequent precipitation or runoff on the valley floor (CEC RSA, 2010). The area of the Chuckwalla Valley watershed encompasses Chuckwalla Valley (601,543 acres) and the surrounding bedrock mountains (258,825 acres), for a total area of approximately 860,368 acres.

Available estimates of recharge in CVGB are variable and in some cases based on incomplete or incorrect data. DWR has not published an estimated recharge rate for the basin (CEC RSA, 2010). In 1986, Woodward Clyde calculated recharge from precipitation for the Chuckwalla Valley watershed to be 29,530 afy (CEC RSA, 2010). This equates to an average recharge rate of approximately 0.036 feet per year (0.4 inches). Woodward Clyde reported this number as approximately 12.8 percent of an average annual precipitation of 3.39 inches per year across the watershed; however, this was the average annual precipitation in Blythe at the time, and does not consider that the orographic effect of the surrounding mountains which results in precipitation rates of over 6 inches per year in the higher elevation portions of the watershed (CEC RSA, 2010).

In 1992, the average recharge to CVGB was reportedly estimated by BLM and the County of Riverside to be 5,540 to 5,600 afy based upon an assumed 10 percent infiltration of precipitation (CEC RSA, 2010); however, this number evidently considered only a portion of the watershed as it would equate to an average annual precipitation depth of only about 1 inch per year across the watershed. Previous studies have demonstrated recharge rates for nearby desert basins ranging from approximately 3 to 5 percent of the total incident precipitation on the basin catchment area (CEC RSA, 2010). A review of recharge studies in the arid southwest performed by USGS (2007b) cited a wide range of recharge rates, but rates in similar basins ranged from about 3 to 7 percent (CEC RSA, 2010).

For this study, recharge from precipitation was estimated by overlaying isohyetal maps prepared by Hely and Peck on the Chuckwalla watershed boundaries and calculating the volume of average annual precipitation for each of four precipitation zones for the valley and bedrock portions of the watershed. Recharge was then estimated as 2, 3, 5 and 10 percent of total incident precipitation and a reasonable lower bound recharge estimate was adopted. Overlays were performed separately for the western watershed, which encompasses the Palen Detailed Analysis Unit (DAU) designated by DWR, and the eastern watershed, which encompasses the Ford DAU designated by DWR. These sub-watersheds drain to Palen and Ford Dry Lakes, respectively. The calculated average annual precipitation volume for the Palen sub-watershed is 156,000 acre-feet based on an area-weighted average precipitation of 4.462 inches and an area of 419,659 acres. The calculated average annual precipitation volume for the Ford sub-watershed is 159,000 acre-feet based on an area-weighted average precipitation of 4.316 inches and an area of 440,709 acres. Recharge from precipitation for the CVGB is estimated as 3, 5, and 7 percent of total incident precipitation and is therefore calculated to be 8,588, 14,313, and 20,038 afy, respectively. An analysis of infiltration and runoff rates for the CVGB is provided in Table 3.20-4.

Based on the above analysis, approximately 36 percent of precipitation in the watershed falls on the bedrock areas that ring the watershed. This is significant because precipitation that falls on the valley floor is not expected to contribute consistently to recharge. Studies published by USGS report approximately 7 to 8 percent of precipitation falling on mountains in other arid basins goes to mountain front recharge (CEC RSA, 2010).

This would amount to approximately 3 percent of the total precipitation that falls on the watershed. In the absence of more detailed study, 3 percent of total precipitation falling on the Chuckwalla Valley watershed (8,588 afy) is used as a reasonable lower bound estimate of recharge from precipitation to the CVGB.

Subsurface Inflow

Subsurface inflow occurs from the Pinto Valley and Orocopia Valley Groundwater Basins. Inflow from the Colorado River is not expected to occur under natural conditions – under natural conditions the CVGB is upgradient from the Palo Verde Mesa Groundwater Basin (PVMGB), and groundwater flows from the CVGB through the PVMGB, towards the Colorado River. Inflow from the Pinto Valley Groundwater Basin has been calculated to be 3,173 afy (CEC RSA, 2010). Inflow from the Orocopia Valley Groundwater Basin has been estimated to be 1,700 afy (CEC RSA, 2010). CH2M Hill estimated the combined subsurface inflow from both basins to be 6,700 afy. However, recent studies by GeoPentech reportedly indicate that subsurface inflow from Orocopia Valley Groundwater Basin may be as low as several hundred afy. Therefore, a combined subsurface inflow rate of 3,500 afy was assumed for both basins, in support of water budget calculations for the project.

Wastewater Return Flow

Water balance in the CVGB is affected by operation of a State prison complex and residential use including a man-made lake associated with the Lake Tamarisk development, near Desert Center. Chuckwalla State Prison was constructed in 1988, and Ironwood State Prison became operational in 1994. The prisons use an unlined pond to dispose of treated wastewater, and a large percentage of this discharge is reported to infiltrate into the subsurface and recharge the CVGB. For the years

TABLE 3.20-4
ESTIMATED RUNOFF AND INFILTRATION IN CHUCKWALLA VALLEY GROUNDWATER BASIN

Layer[a]	Area (acres)	Mean Annual Precipitation (inches)[2]	Total Volume of Rainwater from Mean Annual Precipitation (af)	Runoff Curve Classification[b]	Runoff Curve Number[b]	Runoff (%of Precipitation)	Total Annual Volume of Infiltration – Hely & Peck (af)	Total Annual Volume of Infiltration (af) based on 3%[c]	Total Annual Volume of Infiltration (af) based on 5%[c]	Total Annual Volume of Infiltration (af) based on 7%[c]
unit1-cw	30,303	5	12,626	Alluvium, Steep Slope	74	3.50%	442	379	631	884
	211,498	4	70,499	Alluvium, Flat Slope	69	2.00%	1,410	2,115	3,525	4,935
	41,073	3.5	11,980	Alluvium, Steep Slope	74	3.50%	419	359	599	839
	12,077	4	4,026	Alluvium, Steep Slope	74	3.50%	141	121	201	282
	910	4	303	Alluvium, Steep Slope	74	3.50%	11	9	15	21
	194	4	65	Alluvium, Steep Slope	74	3.50%	2	2	3	5
	81,233	5	33,847	Alluvium, Steep Slope	74	3.50%	1,185	1,015	1,692	2,369
bedrock chuckwalla	32,001	5	13,334	Mountains	93	29.10%	3,880	400	667	933
	21,456	5	8,940	Mountains	93	29.10%	2,602	268	447	626
	11,050	5	4,604	Mountains	93	29.10%	1,340	138	230	322
	109	5	46	Mountains	93	29.10%	13	1	2	3
	9,246	4	3,082	Mountains	93	29.10%	897	92	154	216
	10,042	4	3,347	Mountains	93	29.10%	974	100	167	234
	282	4	94	Mountains	93	29.10%	27	3	5	7
	3,480	4	1,160	Mountains	93	29.10%	338	35	58	81
	275	4	92	Mountains	93	29.10%	27	3	5	6
	90	4	30	Mountains	93	29.10%	9	1	2	2
	398	4	133	Mountains	93	29.10%	39	4	7	9
	316	4	105	Mountains	93	29.10%	31	3	5	7
	39,340	5	16,392	Mountains	93	29.10%	4,770	492	820	1,147
	194	5	81	Mountains	93	29.10%	24	2	4	6
unit3-cw	28,973	3	7,243	Alluvium, Flat Slope	69	2.00%	145	217	362	507
unit2-cw	198,558	3	49,640	Alluvium, Steep Slope	74	3.50%	1,737	1,489	2,482	3,475
bedrock chuckwalla	89,161	6	44,581	Mountains	93	29.10%	12,973	1,337	2,229	3,121
TOTALS	**822,259**	**---**	**286,250**		**---**	**---**	**33,436**	**8,588**	**14,313**	**20,038**

NOTES:

[a] See Figure DR-S&W-179-1 in Solar Millennium 2010a.
[b] From Hely & Peck 1964. Based on a percent of Total Volume of Rainwater from Mean Annual Precipitation (Column 4).

SOURCE: CEC RSA, 2010

1998 through 2001, the California Department of Water Resources – Department of Planning and Local Assistance (CDWR-DPLA) reported that deep percolation of applied urban water in the Chuckwalla Planning Area (assumed to be wastewater return flow) was 500 to 800 afy (CEC RSA, 2010). According to authorities at the State prison complex (CEC RSA, 2010), approximately 600 afy of treated effluent recharges the basin. Water budget information for the proposed Eagle Crest Pumped Storage Project (CEC RSA, 2010) indicates 795 afy of treated effluent are recharged by the prisons. An additional source of wastewater return flow in the basin is approximately 36 afy from the Lake Tamarisk development near Desert Center (CEC RSA, 2010).

Irrigation Return Flow

The amount of applied irrigation water that returns to recharge a groundwater basin depends on the soil, crop type, amount and method of irrigation, and climatic factors. Woodward Clyde reported an irrigation efficiency of 60 percent (return flow of 40 percent) for jojoba crops in Chuckwalla Valley (CEC RSA, 2010). DWR-DPLA reported an irrigation efficiency of 72 percent (return flow of 28 percent) for subtropical crops in the Palen Detailed Analysis Unit (DAU) of the Chuckwalla Planning Area (CEC RSA, 2010). In its water budget calculations for the Chuckwalla Planning Area in support of California Water Plan updates, DWR-DPLA calculated an irrigation return flow of approximately 9 to 11 percent for 1998, 2000 and 2001, respectively. A 10 percent return flow is a reasonable factor for deep percolation from irrigation in the basin, and was applied to the assumed agricultural and landscape water demand in the basin for the purposes of a water budget. Current pumpage associated with activities associated with irrigation return flow is estimated to be approximately 7,700 afy in the CVGB that includes 6,400 afy for agriculture, 215 afy for aquaculture pumping, and 1,090 afy for Tamarisk Lake (CEC RSA, 2010). Return flows are calculated using the mean of DWR-DPLA calculated values, equaling 10 percent (approximately 800 afy) and included in Table 3.20-5.

Groundwater Demand/Outflow

Groundwater provides the only readily available natural water resource in Chuckwalla Valley. While the Colorado River Aqueduct traverses the northern portion of the basin, it does not contribute significant water to the basin (other than leaks and maintenance activities). Designated and potential beneficial uses of groundwater in the basin include domestic, municipal, agricultural and industrial use (CEC RSA, 2010). As such, groundwater demand is a significant contributor to basin outflow. Other sources of basin outflow include subsurface discharge to the Palo Verde Mesa Groundwater Basin, and evapotranspiration at Palen Lake.

Groundwater Extraction

Current and historical groundwater pumping in CVGB includes agricultural water demand, pumping for Chuckwalla and Ironwood State prisons, pumping for the Tamarisk Lake development and golf course, domestic pumping, and a minor amount of pumping by Southern California Gas Company. In addition, historical groundwater pumping included water supply for the Kaiser Corporation Eagle Mountain Mine. With the exception of pumping for Chuckwalla Valley and

Ironwood State Prisons, most of the current groundwater pumping in the basin occurs in the western portion of the basin, near the town of Desert Center. Current groundwater pumping rates are estimated to be approximately 7,900 afy in the western CVGB and 2,605 afy in the eastern basin. Agricultural production is limited to the western portion of the basin (CEC RSA, 2010), with the exception of a relatively limited amount of acreage that is associated with the State prisons.

Subsurface Outflow

Subsurface outflow to Palo Verde Mesa Groundwater Basin was estimated by Metzger in 1973to be 400 afy (CEC RSA, 2010). This calculation was based on a cross sectional profile of the boundary between the two basins derived using geophysical methods and regional data regarding groundwater gradients and hydraulic conductivity. Woodward Clyde revised this estimate based on the results of pump testing in 1986 at Chuckwalla State Prison and calculated the basin outflow to be 870 afy. Engineering Science updated this estimate to 1,162 afy in 1990, presumably as a result of return flow from prison wastewater disposal; however, the rationale for this adjustment was not provided. Using gravity data, Wilson and Owens-Joyce more recently (1994) found that the area through which discharge occurs is significantly more limited than previously thought due to the presence of a buried bedrock ridge. As a result, the most recent available water budget for the basin has adopted an outflow rate of 400 afy (CEC RSA, 2010).

Palen Lake Evapotranspiration

Regional groundwater flow and discharge mapping performed by USGS (CEC RSA, 2010) did not identify Palen Lake as an area where groundwater discharges at the ground surface. Nevertheless, groundwater elevation contour mapping suggests that groundwater may occur near the ground surface beneath approximately the northwestern 25 percent of Palen Lake. It is therefore possible that a portion of Palen Lake is operating as a wet playa. Groundwater levels beneath the southeastern portions of Palen Lake, and a small ancillary playa located approximately one mile southeast of Palen Lake, were reported by Steinemann as being 20 to 30 feet below ground surface (bgs) in 1979, suggesting that Palen Lake would be a dry playa at various times (CEC RSA, 2010).

Review of aerial photography indicates what appears to be a relatively small area of dissected salt pan near the northern and western sides of the playa. Because the salt pan is dissected, it is not clear whether salt deposition is actively occurring or whether this material is residual deposition from surface water evaporation. Immediately northwest of Palen Lake, between Palen Lake and Desert Center-Rice Road, Pleistocene lake bed deposits crop out at the ground surface in the form of dissected, mesa-like prominences that are 5 to 10 feet high (CEC RSA, 2010). These deposits are capped with a layer of caliche and locally support scattered mesquite trees, and alkali sink scrub and honey mesquite are also located between the project site and Palen Dry Lake. For additional discussion of these biological resources, please refer to the Biological Resources section. There does not appear to be any further evidence of shallow groundwater or evapotranspiration visible in aerial photography.

A well located approximately two miles north of Palen Lake, is reported to be completed to a depth of 501 feet bgs and has a ground surface elevation of 500 feet amsl (CEC RSA, 2010). A screened interval for the well is not reported. Groundwater levels in this well were reported to be approximately 20 to 25 feet bgs between 1932 and 1984. Given that the surface elevation at Palen Lake two miles to the south is approximately 460 feet amsl, or 40 feet lower, it appears possible that groundwater levels are very close to the ground surface beneath the northern portion of the playa. In addition, DWR identified the presence of mesquite trees on low mesa-like promontories of Pleistocene lacustrine sediments at the northwest margin of Palen Lake playa in 1963, also suggesting the possible presence of relatively shallow groundwater (CEC RSA, 2010). These data suggest it is possible that an area in the northern portion of Palen Lake is discharging groundwater by evaporation as a wet playa. Groundwater levels beneath the southeastern portions of Palen Lake, and a small ancillary playa located approximately one mile southeast of Palen Lake, are 20 to 30 feet bgs (CEC RSA, 2010), indicating these are dry playa areas.

Review of aerial photography indicates an approximately 700-acre area of dissected salt pan in the northwest portion of the playa (CEC RSA, 2010). This feature is surrounded by an additional approximately 1,300 acres that show evidence of more limited surface salt accumulation. The extent of this area is visible in aerial imagery from November 2005, and was generally confirmed by a reconnaissance performed on December 10 and 30, 2009. Review of the historical progression aerial imagery (CEC RSA, 2010) indicates no or limited salt accumulation in this area from 1996 through 2002, light salt accumulation in March of 2005, and the currently observed salt pan area in November 2005. This suggests that salt pan accumulation in the playa is episodic; however, seasonal, intermittent accumulation cannot be ruled out. Historical precipitation records indicate that 2005 rainfall in Blythe was approximately twice the long term annual average, with 5.10 inches occurring in January and February 2005 (CEC RSA, 2010), just before the March 2005 aerial photograph was taken. These storm events would be expected to have resulted in the accumulation of runoff in Palen Lake, and consequently in dissolution and re-crystallization of salt deposits during evaporation of surface water, and by wetting and subsequent drying of salt containing playa sediments. As such, these rainfall events are likely responsible for at least a portion of the observed salt accumulation; however, groundwater discharge by evaporation at the ground surface also could be responsible.

During a December 10, 2009 site visit by Worley-Parsons, conditions at the northwestern edge of the playa were investigated. Intermittent salt deposits were observed to be located both in low lying areas and on the tops of low, dissected, mesa-like promontories of Pleistocene lacustrine sediments approximately three feet high that extend into the playa (CEC RSA, 2010). Deposition of salt by groundwater evaporation at the surface would be expected to occur on the sides as well as the top of these promontories. The occurrence of salt deposits on the top, but not on the sides, suggests that these deposits are the result of salt dissolution from layers with elevated salt content and redeposition as soil moisture evaporates at the ground surface. The shallow soil beneath the salt deposits was observed to be wetted to a depth of approximately three inches from a recent rain event, but underlying soil to depths of approximately one foot were observed to be generally dry. As such, evidence of salt deposition by evapotranspiration at the playa surface was not observed in this area during Worley-Parsons’ reconnaissance (CEC RSA, 2010).

Groundwater dependent vegetation communities observed at or in the vicinity of the project site include mesquite tree groves along the margins of Palen Dry Lake, woodland habitat along dry desert washes, stands of jackass clover, and desert/alkali sink scrub habitats along the margins of Palen Dry Lake. These and other plant species associated with groundwater dependent vegetation communities are dominated or defined by phreatophytes, deep-rooted plants that obtain a significant portion of their water needs from groundwater. The phreatophytes known to occur in the Project area are mostly “facultative phreatophytes”, or deep rooted plant species that tap into groundwater to satisfy at least some portion of their environmental water requirement, but will also inhabit areas where their water requirements can be met by soil moisture reserves alone. Therefore the presence of mesquite and other groundwater dependent vegetation communities is not necessarily indicative of discharging playas.

In December 2009, Worley-Parsons advanced two hand auger borings to approximately 10 feet bgs beneath the salt pan area in the northwest portion of the playa. The moisture content of the soil was observed to increase with depth in both borings, and free groundwater was encountered at a depth of approximately 8 feet bgs in one of the borings. Subsurface soil encountered consisted of alternating layers clay/silt mixtures and sandy sediments. A depth of 2 to 3 meters is generally the maximum depth of free water documented beneath discharging playas. This suggests that groundwater could be shallow enough to discharge at the surface by capillary rise and evaporation to occur at least some of the time (CEC RSA, 2010).

Based on the above data, salt accumulation at Palen Lake is likely the result of dissolution and recrystallization of existing salt deposits during times of surface water inflow, as well as limited episodic and possibly seasonal or intermittent groundwater discharge. The rate of groundwater discharge in a wet playa depends on the depth to groundwater and magnitude of upward vertical gradients, the ability of subsurface materials to facilitate capillary rise, climatic conditions, and the presence and extent of free water, wetlands and salt pans on the playa surface (CEC RSA, 2010). In general, groundwater discharge rates are highest when groundwater is shallow, temperatures are high, and when open water or wetlands are exposed at the playa surface.

Increased depth to groundwater, lower temperatures, the presence of coarse grained material that inhibits capillary rise, and the presence of salt pan (which increases albedo) tends to decrease groundwater discharge rates. Based on these factors, discharge of groundwater at Palen Lake appears to be limited based on the depth to groundwater (including absence of vegetation that indicates consistent shallow groundwater), the presence of coarse grained layers that limit capillary rise and the apparent intermittent or episodic nature of discharge.

Groundwater discharge rates were estimated based on reported groundwater discharge rates at other playas, the area of identified salt accumulation, and the evident episodic or intermittent nature of salt accumulation. Measured evapotranspiration rates at Franklin Lake Playa were used to form a basis for this estimate (CEC RSA, 2010). Franklin Lake Playa is a well developed and extensively characterized wet playa in the Death Valley area (CEC RSA, 2010). Evapotranspiration rates at Franklin Lake Playa are calculated to be 38 to 41 cm/year (1.3 to 1.4 feet/year) based on the Energy-Balance Eddy-Correlation method, which is reported to be the most reliable method by the USGS. These rates would be a conservative measure of evapotranspiration for active wet playa areas at Palen Lake for the following reasons:

1. Franklin Lake Playa is a terminal playa, which is the terminal discharge point of the local groundwater flow system; whereas, Palen Lake is a bypass playa, with most groundwater flowing laterally past the playa.
2. Franklin Lake Playa includes extensive groundwater discharge features (e.g., saltpan, puffy ground and halophyte wetlands) that are generally less developed or lacking at Palen Lake, indicating less groundwater discharge would be expected at Palen Lake.
3. Evapotranspiration rates at wet playas are temperature dependant, with maximum rates occurring during the summer months. Franklin Lake Playa occurs in Death Valley, where mean annual and summer high temperatures typically exceed those at Palen Lake.
4. The available data suggest that groundwater discharge, if it is occurring at Palen Lake, is episodic or intermittent; whereas groundwater discharge at Franklin Lake Playa occurs throughout the year.

The total area of potential groundwater discharge at Palen Lake is estimated to be approximately 2,000 acres, with salt pan occupying approximately 700 acres of this total. Given the differences between Palen Lake and Franklin Lake Playa previously discussed, a groundwater discharge rate that is approximately half that at Franklin Lake Playa was adopted (approximately 0.0583 feet/acre/month of water) and was believed to occur. Over an area of 2,000 acres for three months of the year, this equates to approximately 350 afy.

Groundwater Budget

The perennial yield (the maximum quantity of water that can be annually withdrawn from a groundwater basin over a long period of time without developing an overdraft condition of CVGB was estimated to be between 10,000 and 20,000 afy (CEC RSA, 2010). A perennial yield of 12,200 afy was adopted in the EIS for the Eagle Crest Landfill project in 1992 (CEC RSA, 2010); however, the amount of recharge from precipitation used to derive this number appears to be based on recharge to only a portion of the basin, so the perennial yield may be underestimated.

A comprehensive water budget was compiled based on published literature, water budget information collected by the DWR for updates to the California Water Plan, information obtained from the California State Prison Authority, and the analysis of basin inflow and outflow discussed in the previous two sections. This information is summarized in Table 3.20-5, and is presented in greater detail in the Staff Assessment for the PSPP (CEC RSA, 2010).

The analysis suggests that the CVGB is in positive balance (inflow exceeds outflow) by approximately 2,600 afy under average conditions.

Water Bearing Units

The following water-bearing formations have been identified in the CVGB. The extent and relationship of these formations is presented in hydrostratigraphic cross sections A-A' included as Figure 3.20-3. The location of the cross section is shown on Figure 3.20-4 (CEC/BLM, 2009).

**TABLE 3.20-5
GROUNDWATER BUDGET (AFY)**

Budget Components	Totals
Inflow	
Recharge from precipitation	8,588
Underflow from Pinto Valley and Orocopia Valley Groundwater Basins	3,500
Irrigation return flow	800
Wastewater return flow	831
Total inflow	13,719
Outflow	
Groundwater extraction	-10,361
Underflow to Palo Verde Mesa Groundwater Basin	-400
Evapotranspiration at Palen dry lake	-350
Total outflow	-11,111
Budget balance (net Inflow)	2,608

Quaternary Alluvium

Quaternary alluvial fill in the basin consists of Holocene to Pleistocene alluvial fan and fluvial (stream) deposits, as well as lacustrine (lake) and playa (ephemeral lake) deposits (CEC RSA, 2010). These deposits consist of gravel, sand, silt and clay (CEC RSA, 2010). In general, coarser alluvial fan deposits are expected near the valley edges and grade into finer distal fan deposits that interfinger with fine grained lacustrine and playa deposits near the center of the basin. These deposits are typically heterogeneous. Valley axial drainages tend to be more uniform and continuous, and contain a greater proportion of sand and fine gravel. Portions of the basin are also occupied by aeolian (wind-blown) sand deposits, but the identified aeolian deposits occur at the ground surface and are of limited thickness. Therefore, they are not believed to be an important water bearing unit.

The Quaternary sediments include the Pleistocene-age Pinto Formation, which consists of coarse fanglomerate (cemented, consolidated or semi-consolidated alluvial fan gravels) containing boulders and lacustrine clay with some interbedded basalt (CEC RSA, 2010). The fanglomerate would likely yield water freely to wells, but the basalt would likely yield only small amounts of water (CEC RSA, 2010). AECOM (2010 as cited in the CEC RSA, 2010) did not report the estimated thickness of the Quaternary Alluvium but suggested the thickness of saturated sediments beneath the site is at least 560 feet and that saturated sediments to a depth of 758 feet consisted of a mixture of fine-grained sands with interbedded silt and clay layers. AECOM suggested that these sediments are likely to be the older alluvium/Bouse Formation sediments described in Bulletin 91-7 (CEC RSA, 2010).

Pliocene Bouse Formation

The Pliocene Bouse Formation underlies the Quaternary sediments. The Bouse Formation includes a marine to brackish-water estuarine sequence deposited in an arm of the proto-Gulf of

California (CEC RSA, 2010). This formation has alternatively been interpreted as, or may include, lacustrine sediments deposited in a closed, brackish basin (CEC RSA, 2010). The Bouse Formation is reported widely in the Colorado Valley and tributary basins in southeastern California and descriptions of this formation come from occurrences outside of Chuckwalla Valley. It is reported to be composed of a basal limestone (marl) overlain by interbedded clay, silt, sand, and tufa. The top of the Bouse Formation is relatively flat lying with a reported dip of approximately 2 degrees south of Cibola (CEC RSA, 2010). The Bouse Formation in the CVGB is estimated to extend to approximately 1,900 feet bgs (approximately –1,500 feet msl) beneath the site based on geophysical modeling (Figure 3.20-2) (CEC/BLM, 2010). These unconsolidated to semi-consolidated sediments are reported to yield several hundred gallons per minute (gpm) to wells perforated in coarse grained units (CEC RSA, 2010).

Miocene Fanglomerate

The Bouse Formation is unconformably underlain by a fanglomerate composed chiefly of angular to subrounded and poorly sorted partially to fully cemented pebbles with a sandy matrix (CEC RSA, 2010). The Fanglomerate is likely Miocene-age; however, it may in part be Pliocene-age (CEC RSA, 2010). The Fanglomerate represents composite alluvial fans built from the mountains towards the valley and the debris of the Fanglomerate likely represent a stage in the wearing down of the mountains following the pronounced structural activity that produced the basin and range topography in the area (CEC RSA, 2010). Bedding surfaces generally dip from the mountains towards the basin. The Fanglomerate reportedly dips between 2 and 17 degrees near the mountains due to structural warping (CEC RSA, 2010). The amount of tilting indicates a general decrease in structural movements since its deposition (CEC RSA, 2010). The Fanglomerate is estimated to extend to approximately 2,600 feet bgs (-2,000 feet msl) beneath the site based on geophysical modeling by Worley-Parsons in 2009 (CEC RSA, 2010).

Bedrock

Bedrock beneath the site consists of metamorphic and igneous intrusive rocks of pre-Tertiary age that form the basement complex (CEC RSA, 2010). In some areas of the basin, volcanic rocks of Tertiary age overlie the basement complex (CEC RSA, 2010). These rocks are considered nonwater bearing. The bedrock topography in the study area as interpreted by modeling of Bouger gravity data obtained from USGS is illustrated in Figure 3.20-2 (CEC/BLM, 2010).

Groundwater Occurrence and Movement

In general, groundwater flow in the basin is south-southeastward (Figure 3.20-5) (CEC/BLM, 2010). Groundwater flow is directed southward from the basin’s boundary with the Cadiz Valley Basin and east-southeastward from its boundary with the Pinto Valley Basin, toward the eastern basin boundary where it flows into the adjacent Palo Verde Mesa Basin (CEC RSA, 2010). The groundwater gradient is steepest in the western half of the basin and is nearly flat in the central portion of the basin (CEC RSA, 2010). Near Ford Dry Lake and east of Ford Dry Lake the gradient becomes steeper as groundwater approaches the narrows in the southeast portion of the basin (CEC RSA, 2010).

Groundwater levels exceed 500 feet amsl in the western portions of the basin and fall to less than 275 feet amsl near the eastern end of the basin in the narrows between the Mule and McCoy Mountains (CEC RSA, 2010). Near Palen Lake, groundwater occurs near the ground surface, resulting in groundwater discharge by evapotranspiration at the land surface. Near Ford Dry Lake, groundwater is reported at depths of 50 feet bgs. Beneath the project site, groundwater occurs at depths of approximately 180-200 feet bgs (approximately 400 feet amsl) based on site-specific investigation (Solar Millennium 2009a).

The DWR reports that groundwater levels in the basin are generally stable (CDWR, 2004). Figure 3.20-6 shows hydrographs for selected wells within the Chuckwalla Valley from 1958 to 2009 (CEC/BLM, 2010). The wells selected to present the hydrograph data were chosen to present the most complete set of historic water level elevation data across the Chuckwalla Valley. The hydrographs show that the water level has been generally stable over the last 40 years in the central and eastern parts of the basin. This area includes the project site. The hydrograph for well 7/20-18H1 in the eastern part of the basin shows a decrease in water level elevation occurred between 1985 and 1990. This well is associated with the Chuckwalla and Ironwood State prisons and the decline in water level is likely due to increased water use at the prisons. The hydrograph for well Township7S Range 18E-14H1 shows a slight (approximately 20 foot) increase in the water level between 1983 and 1992. This well and the three other wells at this location are associated with agriculture activities and the water level increase is likely due to the fallowing of the land.

The hydrographs for wells in the Desert Center area along Highway 177 show local effects of water level decline, attributable to increased agricultural pumping beginning in the early 1980s and ending in the mid 1980s. GEI estimated groundwater pumping in 1986 was about 20,000 afy, significantly up from the 1963 DWR estimate of 9,100 afy. Basin wide pumping declined rapidly since 1986 with recent estimates placing it at about 6,000 afy.

The inconsistency in groundwater level measurements makes it difficult to establish a specific year for the groundwater decline to have started. However, the hydrograph for well 4/16-32M1 suggests the decline started in 1980 and the water level had dropped approximately 50 feet at the time of the last water level measurement. The hydrograph for well 5/15-12N1, located approximately four miles to the southwest of well 4/16-32M1, shows only a small decline (approximately five feet) in the water table elevation. The water level readings in well 5/15-12N1 suggest the water level, at this well, has recovered to pre-pumping levels. The data presented in the hydrographs suggest that pumping around Desert Center induced a local cone of depression in that area that did not extend eastward into the area of the project site. The differential response and recovery to pumping in this area would suggest some compartmentalization of the aquifer system, which is expected since it is comprised of both interconnected and isolated alluvial fan deposits.

Aquifer Characteristics

The basin fill sediments within the CVGB include three aquifers: the alluvium, the Bouse Formation, and the Fanglomerate. Groundwater in the alluvium likely occurs under unconfined conditions but could locally be semi-confined. Groundwater in the Bouse Formation and the Fanglomerate was reported to be under semi-confined to confined conditions based on stratigraphic data and storativity values derived from aquifer pumping tests approximately 17 miles southeast of the project site (CEC RSA, 2010). Table 3.20-6 summarizes the reported and estimated aquifer properties for these aquifers based on data from specific capacity tests and aquifer pumping tests performed on wells in the CVGB.

Groundwater Quality

Groundwater quality varies markedly in the basin. Groundwater in the western portion of the basin near Desert Center generally contains lower concentrations of total dissolved solids (TDS) than groundwater in the eastern, downgradient portion of the basin near Ford Dry Lake (CEC RSA, 2010). Groundwater to the south and west of Palen Lake is typically sodium chloride to sodium sulfate-chloride in character (CEC RSA, 2010). The detected concentrations of TDS in the basin range from 274 mg/L to 8,150 mg/L with an average concentration of 2,100 mg/L (CEC RSA, 2010). In general, the groundwater in the basin has concentrations of sulfate, chloride, fluoride, and dissolved solids too high for domestic use and concentrations of sodium, boron and dissolved solids too high for irrigation use (CEC RSA, 2010). Several of the wells sampled in the basin contain high levels of fluoride and boron.

Groundwater Wells in Proximity to the Project

A total of 88 water supply wells were identified in online databases in the CVGB (Appendix J of Solar Millennium 2009a). A field survey was conducted by AECOM (Solar Millennium 2009a) in July 2009 to identify well locations, confirm operational status, and estimate uses within the basin. The wells were categorized as either domestic, industrial, agricultural or municipal wells based on land use or information provided by the property owner.

A total of 15 wells were identified, most of which supported historic agricultural operations and many of which have been discontinued. Available information for water supply wells located within a one-mile radius of the project site is summarized in Table 3.20-7 and shown in Figure 3.20-7 (CEC/BLM, 2010).

3.20.3 Surface Water Hydrology

The project site is located within the Chuckwalla Valley Drainage Basin. There are no perennial streams in this drainage basin. Chuckwalla Valley is an internally drained basin, and all surface water flows to Palen Dry Lake in the western portion of the valley and Ford Dry Lake in the eastern portion of the valley. Palen Dry Lake is a “wet playa” with possibly significant shallow groundwater discharge at the ground surface by evaporation; whereas, Ford Dry Lake is a “dry playa,” with groundwater occurring well below the ground surface. Palen Dry Lake is located in the central portion of Chuckwalla Valley about 1 mile north of the project site.

Off-site stormwater flows impacting the site are from a large watershed area to the west and north which covers approximately 44 square miles. FEMA flood insurance rate maps have not been prepared for the project site or surrounding lands and the site does not lie within a federally mapped floodplain. The upstream extents of the contributing watersheds extend into the Chuckwalla

TABLE 3.20-6
AQUIFER CHARACTERISTICS

Geologic Unit	Well ID	Well Depth	Specific Capacity (gpm/ft)	Transmissivity (gpd/ft)	Hydraulic Conductivity (ft day)	Storativity	Basis
Alluvium (Western Basin)	OW-2	---		224,400	100	0.05	Aquifer test near Desert Center (Eagle Crest Energy Company 2009)
	CW-1 to CW-4			56,000	50	0.05	Aquifer test of Eagle Mountain Iron Mine wells (Eagle Crest Energy Company 2009)
				1,100-16,000	19.6-42	10^2-10^4	Aquifer test conducted for the project
	Average			**74,000**	**53**	**0.05**	---
Bouse Formation (Eastern Basin)	TW-1	50		21,542	3 to 16		Aquifer test and lab analysis conducted for the Genesis Solar project
	3	957	5	10,000	4		Specific Capacity Test
	26	1,000	1.5	3,000	1		Specific Capacity Test
	29	985	1.6	3,200	1		Specific Capacity Test
	43	830	35	70,000			Specific Capacity Test
	Average			21,500	12 to 14		—
Bouse Formation/ Fanglomerate (Eastern Basin)	33	1,200	14.8	29,600	8	---	Specific Capacity Test
	34	1,200	26.7	53,400	14	---	Specific Capacity Test
	35	1,200	51.6	103,200	28	---	Specific Capacity Test
	36	1,200	15.6	31,200	8	---	Specific Capacity Test
	37	1,050	12.9	25,806	11	0.0002	Aquifer test conducted at State prison
	39	1,139	11.1	22,222	13	---	Specific Capacity Test
	40	1,200	10.3	20,600	5	---	Specific Capacity Test
	42	1,100	19.7	39,444	15	---	Specific Capacity Test
	Average			40,684	13	0.0002	---
Fanglomerate	14	982	2.6	5,200	14		Specific Capacity Test

NOTES: Source: CEC RSA, 2010

Transmissivity from Specific Capacity Tests calculation by multiplying value by 2,000 for confined aquifers and by 1,500 for unconfined aquifers (Driscoll 1986).

TABLE 3.20-7
SUMMARY OF GROUNDWATER QUALITY DATA[a,b]
(ALL VALUES REPORTED IN MG/L UNLESS OTHERWISE INDICATED)[c]

Analyte	Well 5/17-33N1 (2009)	Well 5/17-20F1 (May 1957)	Well 5/17-30F1 (January 1960)	Well 5/17-30P1 (October 1958)	All Chuckwalla Valley Wells[a]
Arsenic	0.0157	—	—	—	—
Bicarbonate (HCO_3)	122	104	90	420	21–1,950
Boron	1.82	0.0001	0.0006	0.0004	—
Calcium	31	50	30	12	5–585
Carbonates (CO_3)	ND[c]	ND	ND	ND	0–129
Fluoride	6.1	1.8	—	0.3	0–12
Chloride	200	203	225	150	8–2,780
Iron	ND<0.1	—	—	—	—
Magnesium	4.72	6		2	0–208
Manganese	0.0127	—	—	—	—
Nitrate (NO_3)	0.17[d]	—	—	—	—
Selenium	ND<0.015	—	—	—	—
Sodium	352	225	240	240	2–6,720
Sulfate	380	241	155	89	9–1,110
Total Hardness ($CaCO_3$)	830	150	75	38	3–2,300
TDS	1,010	803	695	783	274–12,300
pH (units)	—	7.4	8.1	8	7–8.7

NOTES:
[a] Geochemical data for all wells within the Chuckwalla Groundwater Basin from available information in online databases and historic reports is provided in Solar Millennium 2009.
[b] Metals data reported from the unfiltered ("total") sample
[c] mg/L = milligrams per liter; ND – not detected at the practical quantitation limit
[d] Nitrate as Nitrogen.

Mountains to the southwest. The approximate extent of sub-basin boundaries within the overall watershed impacting the project were delineated utilizing a combination of USGS 7.5 minute quadrangle sheets and site specific aerial topography.

The overall watershed boundaries and sub-basin delineations, as well as the 100-year peak discharges for each sub-basin, are shown on Figure 3.20-8. Peak discharges for each sub-basin were calculated using the HEC-HMS model and generally followed the guidelines presented in the *Riverside County Flood Control and Water Conservation District Hydrology Manual*, and are summarized in Table 3.20-8. There is a potential issue of concern related to the watershed delineation of the Corn Springs Wash: A portion of the flow which reaches the Corn Spring Wash crossing at I-10 is diverted to that location by a berm and adjacent incised channel which extends from that crossing to the southeast for a distance of 2500 feet. Is has been assumed this berm is not an engineered or routinely maintained structure. Failure of this berm could result in significant increase in flow coming under I-10 and into the Central Channel.

TABLE 3.20-8
SUMMARY OF OFFSITE PEAK DISCHARGES

Sub-basin ID	Sub-basin Area	Q100 (cfs) (HEC-HMS)	Q100 (cfs) (Regression)[a]
OA	31.24	13,705	12,435
OB	6.31	2,108	3,994
OC	3.61	1,491	2,686
OD	1.04	287	1,110
OE	0.59	173	742
OF	0.95	172	1,041

NOTES:

[a] The regional regression equation used in the analysis above was taken from the U.S. Geological Survey Water-Resources Investigations Report 94 4002: Nationwide Summary of U.S. Geological Survey regional Regression Equations for Estimating Magnitude and Frequency of Floods for Ungaged Sites, 1993. The equation provided was Q100=1080A0.71 for the South Lahontan-Colorado Desert Region.

A comparison was made between the discharge data provided as part of the Drainage Report and discharges obtained using the USGS Regional Regression Equation for the region. The purpose of the comparison was to provide some insight into the reasonableness of the calculated discharges when compared to some other regionally accepted methodology. In general, it appears that the HEC-HMS model and regional regression equations are well-correlated for the largest watershed but are significantly higher in the regional regression equation for the smaller watersheds. The subject area is likely flatter with more dispersed flow than the “average” watershed used in the derivation of the regional regression equation, which could account for lower discharges for the larger watersheds. Overall, the reported discharges appear to be reasonable for the purpose of design, with the exception of the potential for breakout from Corn Springs Wash watershed, which may increase flows in the adjacent watershed.

Dry Washes

There are no perennial streams in the Palen Dry Lake or Ford Dry Lake watersheds which could impact the project site. The vast majority of the time, the area is dry and devoid of any surface flow. Water runoff occurs only in response to infrequent intense rain storms. There are approximately100 minor washes that cross the site from southwest to northeast, draining the area downstream of I-10 towards Palen Dry Lake. Many of these channels do not reach the dry lake but fade out on the vegetated sand dune surface. These channels are typically very subtle, with a width of 2-10 feet and a depth of 3-9 inches. They are found approximately every 100 feet when traversing across the project site perpendicular to the predominant flow direction, which is to the northeast.

Two significant ephemeral wash complexes cross the site from southwest to northeast, draining the area downstream of I-10 towards Palen Dry Lake. Both washes were traceable from the western project boundary to Palen Dry Lake. These major washes are observed as complexes of braided channels, with each channel being approximately 10-50 feet wide. The wash complexes widen out from their constriction at I-10 and are approximately 1,500 feet wide after approximately a mile, after which they become very dispersed, lose definition and resemble minor washes. Within a mile of I-10, the major washes have created sandy zones approximately 1,500 feet wide on the less sandy alluvial gravel or thin sand sheets.

Springs, Seeps and Playa Lakes

One spring is listed in the CVGB in the vicinity of the project site, according to the National Water Information System (NWIS) database of Water Resources of the United States, which is maintained by the USGS. “Corn Spring” is shown on a geologic map of the area (CEC RSA, 2010). Corn Spring is approximately five to six miles southwest of the project site in the center of the Chuckwalla Mountains, at an elevation of approximately 1,600 ft. The spring discharges into Corn Spring Wash, an ephemeral dry wash where surface water flows towards the northeast and onto the project site. Corn Spring appears to derive its water from precipitation falling onto the Chuckwalla Mountains, and movement of groundwater under pressure along a historically active fault that bisects the mountains.

Two perennial springs are located in the eastern portion of Chuckwalla Valley, but are at a greater distance from the project site. These are McCoy Spring, located at the foot of the McCoy Mountains approximately 19 miles northeast of the site at an elevation of approximately 980 ft, and Chuckwalla Spring, located approximately 16 miles south of the site near the foot of the Chuckwalla Mountains, at an elevation of approximately 1,950 ft.

According to the NWIS database, seeps and surface discharge/outfall (along with streams, lakes, wetlands, and diversions) are categorized as “surface water sites” and four sites are located in the CVGB. One of the four locations is the aforementioned Corn Spring Wash. Two other sites are located near the northern edge of the Chuckwalla Mountains approximately eight and 13 miles west of the project site. Water in these three sites appears to originate from infiltration of precipitation that falls on the Chuckwalla Mountains as all three sites are located either within the Chuckwalla Mountains or are less than one mile downslope from the Chuckwalla Mountains.

The fourth surface water site listed in the NWIS database for the CVGB is Coxcomb Wash, located approximately eight miles northwest of the project site. Coxcomb Wash is an ephemeral dry wash that flows southeastward from the Coxcomb Mountains. As a result, groundwater extracted from the project site would not affect the flow of water in Coxcomb Wash. The locations of Corn Spring and other surface water sites identified in the NWIS database and through the several other data sources are shown on Figure 3.20-9 (CEC/BLM, 2010). The sites are listed on Table 3.20-9.

Tenajas are defined as seasonal precipitation-fed or ephemeral stream basins which can hold significant quantities of water. By definition (CEC RSA, 2010), ephemeral streams are a stream or reach of a stream that “flows briefly only in direct response to precipitation in the immediate locality and whose channel is at all times above the water table.” Tenajas act as natural cisterns along an ephemeral stream, and are by definition perched at all times above the groundwater table. Two tenaja locations were located in the study area and are noted, but will not be affected by groundwater extraction because they are not sustained by shallow groundwater. Similarly,

**TABLE 3.20-9
SPRINGS AND SURFACE WATER SITES IN
CHUCKWALLA VALLEY IN THE VICINITY OF THE SITE**

Site No.	Location Number	Location Name	Type	Distance from Project Site (miles)
1	USGS 10253750	Monument Wash near Desert Center, CA	Stream	7.2
2	USGS 10253540	Corn Springs Wash near Desert Center, CA	Stream	6.2
3	USGS 333731115193001	006S016E28DS01S (Corn Spring)	Spring	6.3
4	USGS 10253700	Palen Dry Lake near Desert Center, CA	Stream	13.8
5	USGS 10253800	Coxcomb Wash near Desert, Center CA	Stream	7.1
6	WHIPs ID S-376	Spring Tank	Spring	8.1
7	N/A	Tenaja	Pond	6.8
8	WHIPs ID S-375	Long Tank Tenaja	Pond	8.9
9	N/A	Desert Center Sewer Pond	Pond	8.5

SOURCE: CEC RSA, 2010

numerous wildlife water guzzlers (devices used to collect and store water derived from snow and/or rainwater for later use by wildlife in the area) for small and large game are identified, but these man-made structures are designed to store precipitation and would not be affected by groundwater pumping.

Playas are shallow, centrally located basins in which water gathers after a rain and quickly evaporates. Two playas in the form of Palen Dry Lake and Ford Dry Lake are present in the CVGB. Palen Dry Lake, which is three miles wide and about four miles long, is one mile north of the project site. Ford Dry Lake is about two miles wide and seven miles long and is located about seven miles southeast of the project site.

Stormwater Flow

Stormwater flow across and adjacent to the project site occurs in a network of generally shallow and moderately expressed alluvial channels, and during larger events, as more widespread sheetflow. In general, the channels become shallower and less defined the further they are from the Chuckwalla Mountains. I-10 is an important local control on drainage across the project site, as it intercepts a large number of ephemeral washes draining towards the site from upstream (southwest) of the interstate. These channels are captured by a series of berms and interceptor channels that run parallel with I-10, periodically passing the collected water under I-10 at bridges and creating larger washes that pass under the interstate. There are three distinct locations where this occurs upstream of the project. These flows are relatively concentrated near the southern project boundary, but quickly disperse into a network of smaller and less defined channels under existing conditions.

The Applicant provided graphical results of FLO-2D modeling for existing conditions that confirm the presence of some more defined drainages across the project site as well the occurrence of widespread and shallow sheet flooding across and adjacent to it.

Surface and Groundwater Beneficial Uses

The water quality control plan (or "Basin Plan") of the Colorado River Basin Regional Water Quality Control Board (CRBRWQCB) establishes water quality objectives, including narrative and numerical standards that protect the beneficial uses of surface and ground waters in the region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with Statewide plans and policies and documents comprehensive water quality planning.

Beneficial water uses are of two types—consumptive and non-consumptive. Consumptive uses are those normally associated with people's activities, primarily municipal, industrial and irrigation uses that consume water and cause corresponding reduction and/or depletion of water supply. Non-consumptive uses include swimming, boating, waterskiing, fishing, hydropower generation, and other uses that do not significantly deplete water supplies.

1. Past or Historical Beneficial Uses
   a. Historical beneficial uses of water within the Colorado River Basin Region have largely been associated with irrigated agriculture and mining. Industrial use of water has become increasingly important in the Region, particularly in the agricultural areas.
2. Present Beneficial Uses
   a. Agricultural use is the predominant beneficial use of water in the Colorado River Basin Region, with the major irrigated acreage being located in the Coachella, Imperial and Palo Verde Valleys. The second in quantity of usage is the use of water for municipal and industrial purposes. The third major category of beneficial use, recreational use of surface waters, represents another important segment of the Region's economy.
3. Sources of Drinking Water Policy
   a. All surface and ground waters are considered to be suitable, or potentially suitable, for municipal or domestic water supply with the exception of:
      i. Surface and ground waters where: the total dissolved solids (TDS) exceed 3,000 mg/L, and it is not reasonably expected by the Regional Board to supply a public water system, or
      ii. There is contamination, either by natural process or by human activity, that cannot be treated for domestic use using either Management Practices or best economically achievable treatment practices, or
      iii. The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

Existing uses of waters from springs in the Colorado River Basin include the Box Spring, Crystal Spring, Old Woman Spring, Cove Spring, Mitchell Caverns Spring, Bonanza Spring, Agua

Caliente Spring, Kleinfelter Spring, Von Trigger Spring, Malpais Spring, and Sunflower Spring. Based on a review of available information include the USGS NWIS database, USGS quadrangle maps and data provided by the BLM, none of these springs are within the area that would be influenced by the project. Existing uses of water from springs in the Colorado River Basin include Bousic Spring, Veale Spring, Nett Spring, Gordon Spring, and Arctic Canyon Spring. None of these springs are within the area that would be influenced by the project.

Water quality objectives are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

1. General Surface Water Objectives (CRBRWQCB)

    a. *Aesthetic Qualities* – All waters shall be free from substance attributable to wastewater of domestic or industrial origin or other discharges which adversely affect beneficial uses not limited to: setting to form objectionable deposits; floating as debris, scum, grease, oil, wax, or other matter that may cause nuisances; and producing objectionable color, odor, taste, or turbidity.

    b. *Tainting Substances* – Waters shall be free of unnatural materials which individually or in combination produce undesirable flavors in the edible portions of aquatic organisms.

    c. *Toxicity* – All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or indigenous aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, 96-hour bioassay or bioassays of appropriate duration or other appropriate methods as specified by the CRBRWQCB. Effluent limits based upon bioassays of effluent will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data to become available, and source control of toxic substances will be encouraged. The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or other control water which is consistent with the requirements for "experimental water" as described in Standards Methods for the Examination of Water and Wastewater.

    d. *Temperature* – temperature shall not be altered.

    e. *pH* – shall range from 6.0 to 9.0

    f. *Dissolved Oxygen* – shall not be reduced below the following minimum levels at any time: warm – 5.0 mg/L, cold – 8.0 mg/L, and warm and cold – 8.0mg/L

    g. *Total Dissolved Solids* – discharges of wastes or wastewater shall not increase the total dissolved solids content of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such an increase in total dissolved solids does not adversely affect beneficial uses.

    h. *Bacteria* – The geometric mean of the indicated bacterial densities should not exceed one or the other of the following: E. coli – 630 colonies (col) per 100 ml and enterococci – 165 col per 100 ml. Nor shall any sample exceed one other following maximum allowable: E. coli 2000 col per 100 ml and enterococci 500 col per 100 ml.

Any discharge, except from agricultural, shall not cause concentration of total dissolved solids in surface waters to exceed the following limits:

TDS (mg/L)	Annual Average	Maximum
Coachella Valley Drains	2,000	2,500
Palo Verde Valley Drains	2,000	2,500

2. General Groundwater Objectives: Establishment of numerical objectives for groundwater involves complex considerations and it is acknowledged that the quality of groundwater varies significantly throughout the CVGB and varies with depth. It is the CRBRWQCB's goal to maintain the existing quality of non-degraded groundwater basins and to minimize the quantities of contaminants reaching any groundwater basin.

    a. Groundwater designated for domestic or municipal supply shall not contain taste or odor producing substances

    b. Groundwater designated for domestic or municipal supply shall not contain coliform organisms in excess of limits specified in the regulations.

    c. Groundwater designated for domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, Title 22 regulations.

    d. Discharges of water softeners regeneration brines, other mineralized wastes, and toxic wastes to disposal facilities which ultimately discharge in areas where such waste can percolate to ground waters useable for domestic and municipal purposes, are prohibited.

Wastewater reclamation and reuse is encouraged, however, such use must meet applicable water quality standards.

3.21 Wild Horse and Burros

As shown on Map 2-26 of the approved Northern and Eastern Colorado Desert Coordinated Management Plan (BLM CDD, 2002), there are no Wild Horse and Burro Herd Areas or Herd Management Areas within or adjacent to the project area or right-of-way application area.

3.22 Wildland Fire Ecology

The Biological Resources Study Area (Study Area) is located within the boundaries of BLM's NECO Plan. The NECO Plan boundary is shown in Figure 3.18-1. Compared to other parts of the State, there are relatively few fires in the planning area and most are small. In the 15 years between 1980 and 1995, a handful of fires burned a total of about 6,000 acres, all outside the project study area. Of this amount, about 900 acres in the Chemehuevi Critical Habitat Unit and about 11 acres in the Chuckwalla Critical Habitat Unit burned. Most fires in the desert are caused by lightning or vehicles.

The BLM and National Park Service (NPS) have collaborated in the development of the Fire Management Activity Plan (FMAP) 1996 for the California Desert. The FMAP brings together fire management goals for biological resources, wilderness, and other sources and establishes fire management standards and prevention and protection programs. The FMAP includes limitations on fire suppression methods in critical habitat and other tortoise habitat; the limitations are designed to limit habitat disturbance while keeping fires small.

The vegetation-fuel types in the project study area, Sonoran creosote bush scrub, desert dry wash woodland, unvegetated ephemeral dry wash, desert sink scrub, and desert dunes, are not fire-adapted. Fire, particularly repeated wildfire, is deleterious to these plant communities and tends to deplete the native woody shrubs that characterize and dominate these communities in favor of exotic weedy annuals (see Figure 3.18-1).

Exotic and invasive weedy annual plants such as Mediterranean splitgrass and red brome form a complete ground cover in some places, where they have displaced native annual and perennial grasses and forbs. There are indications that the increase in exotic annual grasses might be enhanced by nitrogen deposition from air pollution originating outside of the planning area (e.g., Los Angeles Basin, Coachella Valley) (BLM CDD, 2002). There is some evidence that disturbances such as livestock grazing, OHV use, and fire have contributed to the spread of exotic annuals (BLM CDD, 2002).

Disturbed areas are more likely to support exotic annual weeds. There are two of these cover types in the project study area: Developed and Agricultural land, totaling 900 acres (see Section 3.18, *Vegetation Resources*). These areas are most likely to support or carry wildfires in the project study area. The amount and extent of vehicle use and the amount and extent of disturbed areas are the primary variables in predicting changes to wildfire size and frequency.

Sonoran Desert Scrub is the dominant community type within the NECO Planning Area, covering 3.8 million acres, or 69 percent of the total area. The large majority of its distribution (86 percent) is on public lands. Major threats to this community type include fire, grazing, off-road vehicles, and invasions of alien species. Sonoran creosote bush scrub occupies approximately 74 percent of the project study area.

Wildfire suppression occurs with the minimum surface disturbance practical in all habitats. Wildfires are suppressed using a mix of only the following methods in order to minimize habitat disturbance:

1. Aerial attack,
2. Crews using hand tools to create fire breaks,
3. Mobile attack engines limited to public roads, designated open routes, and routes authorized for limited-use,
4. Use of foam and/or fire retardant, and
5. Use of earth-moving equipment or tracked vehicles (such as bulldozers) in critical situations to protect life, property, or high-value resource.

Post fire-suppression mitigation includes rehabilitation of firebreaks and other ground disturbances and obliteration of vehicle tracts sufficient to discourage future casual use. Hand tools are used for rehabilitation activities whenever feasible.

3.23 Wildlife Resources

This section is based on, and draws heavily from, the CEC's Staff Assessment and Revised Staff Assessment for the Palen Solar Power Project (PSPP) (CEC/BLM, 2010; CEC RSA, 2010). The PSPP would be located in the Chuckwalla Valley between the Chuckwalla and Palen mountains in eastern Riverside County (DTPC, 2006 as cited in the CEC RSA, 2010). The Biological Resources Study Area (Study Area) consists of a 14,771-acre area that encompasses the Project Disturbance Area (including the transmission Disturbance Area) and a surrounding buffer area. The project site would be located within the central portion of Chuckwalla Valley, an area east of Palm Springs in the remote Colorado Desert, a subsection of the Sonoran Desert.

The project site is located within two areas designated in the NECO plan as wildlife habitat management areas (WHMA): Palen-Ford WHMA and Desert Wildlife Management Area (DWMA) Connectivity WHMA. Management emphasis for the Palen-Ford WHMA is on the management of the dunes and playas within the Palen-Ford dune system. Management emphasis for the DWMA Connectivity WHMA is on the geographic connectivity for the desert tortoise for the conservation areas east of Desert Center (i.e., connectivity between the Chuckwalla DWMA and the wilderness area north of I-10). The Palen-McCoy Wilderness is approximately 3 miles to the northeast of the project site, the Chuckwalla Desert Wildlife Habitat Management Area (DWMA) is located approximately 2 miles to the south, and the Palen Dry Lake ACEC borders the project site to the east.

Examples of common animal species observed or detected in the Study Area included house finch (*Carpodacus mexicanus*), white-crowned sparrow (*Zonotrichia leucophrys*), northern flicker (*Colaptes auratus*), Say's phoebe (*Sayornis saya*), kangaroo rat (*Dipodomys sp.*), round-tailed ground squirrel and antelope ground squirrel (*Spermophilus tereticaudus*, *Ammospermophilus leucurus*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), desert kit fox (*Vulpes macrotis arsipus*), and coyote (*Canis latrans*)(HELIX, 2010 as cited in the CEC RSA, 2010).

3.23.1 Special Status Wildlife

Special-status wildlife are species that have been afforded special recognition by Federal, State, or local resource agencies or organizations. Listed and special-status species are often of relatively limited distribution and typically require unique habitat conditions. Special-status wildlife are defined as meeting one or more of the following criteria:

1. Listed as threatened or endangered or candidates for future listing as threatened or endangered under FESA or CESA;
2. Protected under other statutes or regulations (e.g., Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, etc.);
3. Listed as species of concern by CDFG;

4. Considered a locally significant species. That is, a species that is not rare from a State-wide perspective, but is rare or uncommon in a local context such as within a county or region, or is so designated in local or regional plans, policies, or ordinances; or

5. For consistency with the SA/DEIS, any other species receiving consideration during environmental review under CEQA.

The BLM designates Sensitive species as those requiring special management considerations to promote their conservation and reduce the likelihood and need for future listing under FESA. BLM Sensitive species include all Federal Candidate and Federally Delisted species which were so designated within the last 5 years, and CNPS List 1B species that occur on BLM lands. For the purposes of this document, all BLM Sensitive species are analyzed as special-status species.

Wildlife Resources Table 3.23-1 lists all special-status wildlife species evaluated during the analysis that are known to occur, or could potentially occur in the study area and vicinity. Special-status wildlife species detected, considered possible, or likely to occur based on known occurrences in the vicinity and suitable habitat present within the Study Area, are discussed in more detail below. Special-status species observed during the 2009 field surveys are indicated by **bold-face type** (Solar Millennium, 2009a; AECOM, 2010a as cited in the CEC RSA, 2010).

3.23.2 Desert Tortoise

The desert tortoise was State-listed in California as threatened on August 3, 1989. The Mojave population was listed as threatened under FESA on April 2, 1990, and critical habitat was designated on February 8, 1994. The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, and southwestern Utah, and in the Sonoran (Colorado) Desert in California (USFWS, 1990; USFWS, 1994a as cited in the CEC RSA, 2010). The desert tortoise's range, outside the listed Mojave population, extends into the Sonoran Desert, where tortoises occur in the lower Colorado River Valley, Arizona uplands, plains of Sonora, and Sonora's central Gulf Coast; the species has not been documented in northeastern Baja California (Germano et al., 1994 as cited in the CEC RSA, 2010) (Figures 3.23-1 and 3.23-2).

Desert tortoises are well adapted to living in a highly variable and often harsh desert environment. They spend much of their lives in burrows, even during their seasons of activity, which generally coincides with the greatest annual forage availability. In late winter or early spring, they emerge from over-wintering burrows and typically remain active through fall. Activity does decrease in summer, but tortoises often emerge after summer rain storms to drink (Henen et al., 1998 as cited in the CEC RSA, 2010).

During activity periods, desert tortoises eat a wide variety of herbaceous vegetation, particularly grasses and the flowers of annual plants (Berry, 1974; Luckenbach, 1982; Esque, 1994 as cited in the CEC RSA, 2010). During periods of inactivity, they consume very little food and their metabolism and water loss are reduced. Adult desert tortoises lose water at such a slow rate that they can survive for more than a year without access to free water of any kind and can apparently

TABLE 3.23-1
SPECIAL-STATUS WILDLIFE KNOWN OR WITH POTENTIAL TO OCCUR IN THE BIOLOGICAL RESOURCES STUDY AREA

WILDLIFE		
Common Name	**Scientific Name**	**Status State/Federal**
Reptiles/Amphibians		
Desert tortoise	***Gopherus agassizii***	**ST/FT/_**
Couch's spadefoot toad	*Scaphiopus couchii*	CSC/__/BLM Sensitive
Mojave fringe-toed lizard	***Uma scoparia***	**CSC/_/BLM Sensitive**
Birds		
Western burrowing owl	***Athene cunicularia hypugaea***	**CSC/BCC/BLM Sensitive**
Golden eagle	*Aquila chrysaetos*	CFP/__/BLM Sensitive
Short-eared owl	*Asio flammeus*	CSC/__/__
Ferruginous hawk	*Buteo regalis*	WL/__/BLM Sensitive
Swainson's hawk	***Buteo swainsoni***	**ST**/__/__
Prairie falcon	***Falco mexicanus***	**WL**/__/__
American peregrine falcon	*Falco peregrinus anatum*	CFP/__/__
Vaux's swift	***Chaetura vauxi***	**CSC**/__/__
Mountain plover	*Charadrius montanus*	CSC/__/BLM Sensitive
Northern harrier	***Circus cyaneus***	**CSC**/__/__
Gilded flicker	*Colaptes chrysoides*	SE/__/__
Yellow warbler	*Dendroica petechia sonorana*	CSC/__/__
California horned lark	***Eremophila alpestris actia***	**WL**/__/__
Yellow-breasted chat	*Icteria virens*	CSC/__/__
Loggerhead shrike	***Lanius ludovicianus***	**CSC/BCC**/__
Gila woodpecker	*Melanerpes uropygialis*	SE/__/__
Black-tailed gnatcatcher	*Polioptila melanura*	__/__/__
Purple martin	***Progne subis***	**CSC**/__/__
Vermilion flycatcher	*Pyrocephalus rubinus*	CSC/__/__
Bendire's thrasher	*Toxostoma bendirei*	CSC/__/BLM Sensitive
Crissal thrasher	*Toxostoma crissale*	CSC/__/__
Le Conte's thrasher	***Toxostoma lecontei***	**WL/BCC/BLM Sensitive**
Mammals		
Pallid bat	*Antrozous pallidus*	CSC/__/BLM Sensitive
Townsend's big-eared bat	*Corynorhinus townsendii*	CSC/__/BLM Sensitive
Spotted bat	*Euderma maculatum*	CSC/__/BLM Sensitive
Western mastiff bat	*Eumops perotis californicus*	CSC/__/BLM Sensitive
Hoary bat	*Lasiurus cinereus*	__/__
California leaf-nosed bat	*Macrotus californicus*	CSC/__/BLM Sensitive
Arizona myotis	*Myotis occultus*	CSC/__/__
Cave myotis	*Myotis velifer*	CSC/__/BLM Sensitive
Yuma myotis	*Myotis yumanensis*	__/__/BLM Sensitive
Colorado Valley woodrat	*Neotoma albigula venusta*	__/__

TABLE 3.23-1 (Continued)
SPECIAL-STATUS WILDLIFE KNOWN OR WITH POTENTIAL TO OCCUR IN THE BIOLOGICAL RESOURCES STUDY AREA

WILDLIFE		
Common Name	**Scientific Name**	**Status State/Federal**
Mammals (cont.)		
Pocket free-tailed bat	*Nyctinomops femorosaccus*	CSC/__/__
Big free-tailed bat	*Nyctinomops macrotis*	CSC/__/__
Burro deer	***Odocoileus hemionus eremicus***	**CPGS__/__/__**
Nelson's bighorn sheep	*Ovis canadensis nelson*	__/BLM Sensitive
Yuma mountain lion	*Puma concolor browni*	CSC/__/__
American badger	***Taxidea taxus***	**CSC/__/__**
Desert kit fox	***Vulpes macrotis arsipus***	**CPF/__/__**

Status Codes:

Federal FE = Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT = Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC = Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities, www.fws.gov/migratorybirds/reports/BCC2002.pdf

State CSC = California Species of Special Concern Species of concern to CDFG because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
CFP = California Fully Protected
SE = State listed as endangered
ST = State listed as threatened
WL = State watch list
CPF = California Protected Furbearing Mammal
CPGS = California Protected Game Species

Bureau of Land Management
BLM Sensitive = Species that require special management consideration to avoid potential future listing under the FESA and that have been identified in accordance with procedures set forth in BLM Manual 6840, the Special Status Species Management Manual for the Bureau of Land Management (Dec. 12, 2008).

SOURCE: CNDDB, 2010 as cited in the CEC RSA, 2010

tolerate large imbalances in their water and energy budgets (Nagy and Medica, 1986; Peterson, 1996a,b; Henen et al., 1998 as cited in the CEC RSA, 2010).

The size of desert tortoise home ranges varies with respect to location and year (Berry, 1986a as cited in the CEC RSA, 2010), and also serves as an indicator of resource availability and opportunity for reproduction and social interactions (O'Connor et al., 1994 as cited in the CEC RSA, 2010). Females have long-term home ranges that may be as little as or less than half that of the average male, which can range to up to 200 acres (Burge, 1977; Berry, 1986a; Duda et al., 1999; Harless et al., 2009 as cited in the CEC RSA, 2010). Core areas used within tortoises' larger home ranges depend on the number of burrows used within those areas (Harless et al., 2009 as cited in the CEC RSA, 2010). Over its lifetime, each desert tortoise may use more than 1.5 square miles of habitat and may make periodic forays of more than 7 miles at a time (Berry, 1986a as cited in the CEC RSA, 2010).

Tortoises are long-lived and grow slowly, requiring 13 to 20 years to reach sexual maturity. They have low reproductive rates during a long period of reproductive potential (Turner et al., 1984a; Bury, 1987; Germano, 1994 as cited in the CEC RSA, 2010). Mating occurs both during spring and fall (Black, 1976; Rostal et al., 1994 as cited in the CEC RSA, 2010), and the number of eggs as well as the number of clutches (set of eggs laid at a single time) that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Turner et al., 1986, 1987; Henen, 1997; McLuckie and Fridell, 2002 as cited in the CEC RSA, 2010). Egg-laying occurs primarily from April to July (Rostal et al., 1994; USFWS, 1994a as cited in the CEC RSA, 2010); the female typically lays 2-14 eggs (average 5-6) eggs in an earthen chamber excavated near the mouth of a burrow or under a bush (Woodbury and Hardy, 1948; USFWS, 1994a as cited in the CEC RSA, 2010). The eggs typically hatch 90 to 120 days later, between August and October. The success rate of clutches has proven difficult to measure, but predation, while highly variable (Bjurlin and Bissonette, 2004 as cited in the CEC RSA, 2010), appears to play an important role in clutch failure (Germano, 1994 as cited in the CEC RSA, 2010).

The majority of threats to the desert tortoise and its habitat are associated with human land uses. Many of those identified in the Desert Tortoise (Mojave Population) Recovery Plan (1994 as cited in the CEC RSA, 2010), and that formed the basis for listing the species as threatened, continue to affect the tortoise today (USFWS, 2008a as cited in the CEC RSA, 2010). Some of the threats identified at the time of listing include urbanization, upper respiratory tract disease and possibly other diseases, predation by common ravens and domestic and feral dogs, unauthorized off-road vehicle activity, authorized vehicular activity, illegal collecting, mortality on paved roads, vandalism, drought, livestock grazing, feral burros, non-native plants, changes to natural fire regimes, and environmental contaminants (USFWS, 1994a as cited in the CEC RSA, 2010).

Even though a wide range of threats are known to affect desert tortoises and their habitat, very little is known about their demographic impacts on tortoise populations or the relative contributions each threat makes to tortoise mortality (Boarman, 2002a as cited in the CEC RSA, 2010). Extensive research shows that all of these threats can directly kill or indirectly affect tortoises; research has also clarified many mechanisms by which these threats act on individuals. While current research results can lead to predictions about how local tortoise abundance should be affected by the presence of threats, quantitative estimates of the magnitude of these threats, or of their relative importance, have not yet been developed. Thus, the revised recovery plan focuses on expanding the knowledge of individual threats and places emphasis on understanding their multiple and combined effects on tortoise populations (USFWS, 2008a as cited in the CEC RSA, 2010).

The original Desert Tortoise (Mojave Population) Recovery Plan identified 6 recovery units (Upper Virgin River, Northeastern Mojave, Eastern Mojave, Eastern Colorado, Northern Colorado, and Western Mojave) and recommended the establishment of 14 DWMAs throughout the recovery units (USFWS, 1994a as cited in the CEC RSA, 2010)(Figure 3.23-1). Since 1994, greater insight into patterns of both ecological and genetic variation within the Mojave tortoise population has been gained. While the revised recovery plan has not yet been finalized, based on this new information, the revision redefines the recovery units to balance both distinctiveness and variability within the population. Given the generally continuous variation in genetic structure and biomes across the Mojave desert tortoise's range, the approach in delineating revised recovery units stresses identification of geographic discontinuities or barriers that coincide with any observed variation among tortoise populations. Several potential barriers are evident from topographic maps, the U.S. Geological Survey habitat model (Nussear et al., 2009 as cited in the CEC RSA, 2010), and landscape genetic analyses (Hagerty, 2008 as cited in the CEC RSA, 2010). Differences in genetic, ecological, and physiological characteristics to help highlight boundaries or other differences between units were used in the delineation. In doing this, the USFWS considered demographic, ecological, and behavioral considerations to be of greater importance than genetic issues alone, as have been suggested by researchers providing recommendations on the formulation of conservation plans for threatened or endangered species (Avise, 2004, pp. 486, 487; Mace and Purvis, 2008 as cited in the CEC RSA, 2010). The draft revised recovery plan reduces the number of recovery units from six to five, which reflects the newly obtained information and ensures that local adaptations and critical genetic diversity are maintained (USFWS, 2008a as cited in the CEC RSA, 2010).

According to the 1994 Recovery Plan, the project would be located within Eastern Colorado Recovery Unit, which was merged with the Northern Colorado Recovery Unit in the draft revised recovery plan and referred to simply as the Colorado Desert Recovery Unit (USFWS, 2008a as cited in the CEC RSA, 2010). Within this recovery unit, desert tortoise are found primarily in "well-developed washes, desert pavements, piedmonts, and rocky slopes characterized by relatively species-rich succulent scrub, creosote bush scrub, and blue palo verde-ironwood-smoke tree communities" (USFWS, 1994a as cited in the CEC RSA, 2010). Habitat within this recovery unit has been described as being in excellent condition despite declines in tortoise densities over the past several decades; disturbance was estimated at less than 1.3 percent throughout (USFWS, 2005 as cited in the CEC RSA, 2010). The highest desert tortoise densities within this recovery unit occur in Chemehuevi and Ward valleys (approximately 60 miles north of the project site), on the Chuckwalla Bench within the Chuckwalla Desert Wildlife Management Area (DWMA and associated Critical Habitat Unit are shown in Figure 3.23-1) and in Joshua Tree National Park (approximately 40 miles northwest of the project site). Desert tortoise densities at the Chuckwalla Bench in 1992 were estimated between 22 and 49 adults per square kilometer (approximately 57–127 adults per square mile) but have shown declining trends (Berry, 1997; Tracey et al., 2004 as cited in the CEC RSA, 2010). According to the 1994 Recovery Plan, tortoise densities in the Eastern Colorado Recovery Unit were estimated between 5 and 175 adult tortoises per square mile and the area was given a threat level of 4 out of 5 (5 = extremely high) (USFWS, 1994a as cited in the CEC RSA, 2010). Density estimates based on range-wide line distance sampling monitoring from 2001–2005 (USFWS, 2006 as cited in the CEC RSA, 2010) are lower than estimates from earlier studies (Luckenbach, 1982; Berry, 1984 as cited in the CEC RSA, 2010), but these simple comparisons cannot be taken at face value when the historical monitoring efforts were conducted using different techniques and with different goals. Differences may also reflect a difference in scale between methods, with relatively large historical tortoise densities estimated in small, local areas being smoothed over larger areas with range-wide sampling. However, low tortoise densities across recovery units from 2001-2005 also may represent continued decline of populations throughout the Mojave Desert since the species was listed (USFWS, 2006 as cited in the CEC RSA, 2010).

Protocol-level surveys of the Study Area were conducted between March 17 and May 22, 2009 (Study Area except substation) and October 24 to 25, 2009 (substation site and buffer). Survey results of the Project Disturbance Area include 17 burrows (Class 3–5), 15 pallets (Class 4 or 5), and 19 tortoise shell remains (Class 5) (AECOM, 2010a as cited in the CEC RSA, 2010). Preliminary spring survey results identified seven tortoises (adult and juvenile) in the project area; four along the generation tie line and three other tortoises south of I-10, the latter being outside of the Project Disturbance Area and buffer area. Only one of these occurrences was within the Project Disturbance Area along the gen-tie line (Solar Millennium, 2010k, Table 1). Additional observations from project area buffers are included in the Applicant's Revised Desert Tortoise Technical Report (Galati & Blek, 2010b as cited in the CEC RSA, 2010). In addition, resource agency staff located a possible desert tortoise burrow near the bridge associated with the large wash that flows into the center of the Project Disturbance Area (LaPre, pers. comm. as cited in the CEC RSA, 2010).

The Applicant has indicated that the Project Disturbance Area north of I-10 (including the Chuckwalla Critical Habitat Unit [CHU]) supports lower quality desert tortoise habitat and the only moderate quality habitat within the Project Disturbance Area is south of I-10 (Galati & Blek, 2010b; Solar Millennium, 2010m, Table 5 as cited in the CEC RSA, 2010). The Applicant has indicated that approximately 3,738 acres of suitable habitat occurs in the Project Disturbance Area, which encompasses all habitats excluding developed, agriculture, and stabilized and partially stabilized desert dunes (Solar Millennium 2010m, Table 5 as cited in the CEC RSA, 2010). Aside from developed areas and sand dunes, the entire Project Disturbance Area contains suitable habitat of this species. Higher value habitat is found south of I-10 corresponding with higher elevation alluvial fan plant communities.

3.23.3 Mojave Fringe-toed Lizard

The Mojave fringe-toed lizard is endemic to southern California and a small area of western Arizona, where it is restricted to aeolian sand habitats in the deserts of Los Angeles, Riverside, and San Bernardino Counties in California and La Paz County in Arizona (Hollingsworth and Beaman, 1999; Stebbins, 1985 as cited in the CEC RSA, 2010)(Figures 3.23-3 and 3.23-4). Nearly all records for this species are associated with present-day and historical drainages and associated sand dune complexes of the Mojave and Amargosa Rivers (Norris, 1958 as cited in the CEC RSA, 2010).

The distribution of Mojave fringe-toed lizards is naturally fragmented because of its obligate habitat specificity to loose sand, a patchy habitat type (Murphy et al., 2007 as cited in the CEC RSA, 2010). Many local populations of this species are quite small, with small patches of sand supporting small populations of lizards. This fragmented pattern of distribution leaves the species vulnerable to local extirpation from additional habitat disturbance and fragmentation (Murphy et al., 2007 as cited in the CEC RSA, 2010). The loose wind-blown sand habitat, upon which the species is dependent, is a fragile ecosystem requiring the protection against both direct and indirect disturbances (Weaver, 1981; Barrows, 1996 as cited in the CEC RSA, 2010). Environmental changes that stabilize sand, affect sand sources, or block sand movement corridors will affect this species (Turner et al., 1984; Jennings and Hayes, 1994 as cited in the CEC RSA, 2010). Additional threats to this species include habitat loss or damage from urban development, off-highway vehicles (OHV), and agriculture. Aside from the direct loss of land, development can also increase predators, such as the common raven or coyote, to occupied habitat.

Murphy et al. (2006 as cited in the CEC RSA, 2010) identified two maternal lineages of this species; the northern lineage is associated with the Amargosa River drainage system, and the southern with the Mojave River drainage system, Bristol Trough, Clark's Pass (including Palen Lake and Pinto Wash), and the Colorado River sand transport systems.

The Mojave fringe-toed lizard is found in arid, sandy, sparsely vegetated habitats and is associated with creosote scrub throughout much of its range (Norris, 1958; Jennings and Hayes, 1994 as cited in the CEC RSA, 2010). This species is totally restricted to habitats of fine, loose, aeolian sand, typically with sand grain size no coarser than 0.375 mm in diameter (Turner et al., 1984; Jennings and Hayes, 1994; Stebbins, 1944 as cited in the CEC RSA, 2010). It burrows in the sand for both cover from predators and protection from undesirable temperatures (Stebbins, 1944 as cited in the CEC RSA, 2010), though it also will seek shelter in rodent burrows. They are primarily insectivorous, but also eat plant food including leaves, seeds and buds (Stebbins, 1944 as cited in the CEC RSA, 2010).

Mojave fringe-toed lizards normally hibernate from November to February, emerging from hibernation sites from March to April. The breeding season is April to July. Adult Mojave fringe-toed lizards reach sexual maturity two summers after hatching. Females deposit 2-5 eggs in sandy hills or hummocks in May through July (Mayhew, 1964, Jennings and Hayes, 1994 as cited in the CEC RSA, 2010). April to May, while temperatures are relatively cool, this species is active during mid-day. From May to September, they are active in mornings and late afternoon, but seek cover during the hottest parts of the day. Common predators of the Mojave fringe-toed lizard include burrowing owls, leopard lizards, badgers, loggerhead shrikes, roadrunners, various snakes, and coyotes (Jennings and Hayes, 1994 as cited in the CEC RSA, 2010).

Nearly half of the Project Disturbance Area, or approximately 1,781 acres (Solar Millennium, 2009m), contains suitable Mojave fringe-toed lizard habitat, including stabilized and partially stabilized sand dunes, some wash habitat, and other areas within Sonoran creosote bush scrub habitat with appropriate soils (Solar Millennium, 2009a-AFC Volume II, Appendix F as cited in the CEC RSA, 2010). Numerous Mojave fringe-toed lizards were found in the northeastern half of the Study Area during spring 2009 and 2010 surveys, including 112 within the Project Disturbance Area during 2009 (Solar Millennium, 2009a-AFC Volume II, Appendix F as cited in the CEC RSA, 2010). During 2010 spring surveys, five Mojave fringe-toed lizards were observed within the project Study Area for a total of 117 observations of this species within the Project Disturbance Area from 2009 and 2010 (Solar Millennium, 2010m, Table 6; Solar Millennium, 2010k, Table 3 as cited in the CEC RSA, 2010). An additional 62 Mojave fringe-toed lizards were observed within the buffer area according to preliminary spring 2010 survey results (Solar Millennium 2010k, Table 3 as cited in the CEC RSA, 2010).

3.23.4 Couch's Spadefoot Toad

Couch's spadefoot toad is found in southeastern California east through Arizona, New Mexico, Texas, and Oklahoma, south to San Luis Potosi, Nayarit, Mexico, at the southern tip of Baja California, Mexico, and an isolated population in Colorado. In California, it is found in the extreme southeast, including southeastern San Bernardino County and eastern Riverside and Imperial Counties (Jennings and Hayes, 1994 as cited in the CEC RSA, 2010). The project area is west of the range for this species as the range is described in the NECO plan (BLM CDD, 2002 as cited in the CEC RSA, 2010) and Amphibian and Reptile Species of Special Concern in California (Jennings and Hayes, 1994 as cited in the CEC RSA, 2010) (Figure 3.23-5); however, Dimmitt (1977 as cited in the CEC RSA, 2010) identifies the Palen Dry Lake area as a place of interest for further surveys.

Couch's spadefoot toad is found in a variety of plant communities, including desert dry wash woodland, shortgrass plains, creosote bush scrub, and alkali sink scrub. The species requires habitat with substrate capable of sustaining temporary pools for breeding, and loose enough to permit burial in subterranean burrows (Jennings and Hayes, 1994; BLM CDD, 2002 as cited in the CEC RSA, 2010). Breeding habitat includes temporary impoundments at the base of dunes as well as road or railroad embankments, temporary pools in washes or channels, pools that form at the downstream end of culverts, and playas (Morey, 2005; Morey, pers. comm.; Mayhew, 1965 as cited in the CEC RSA, 2010). Natural scour sites in washes with breeding toads (included in Dimmitt 1977 as cited in the CEC RSA, 2010) can wash down to a hardpan, enabling ponding (Dimmitt, pers. comm. as cited in the CEC RSA, 2010). The majority of known breeding ponds are artificial possibly because of the difficulty of locating natural ponds within the limited amount of time ponds may retain water. Couch's spadefoot toads primarily eat termites, but they also eat beetles, ants, grasshoppers, solpugids, scorpions, and centipedes.

This species is dormant from 8-10 months of the year, emerging from burrows at the onset of warm summer rains. Emergence appears to be triggered by the low frequency sound caused by falling rain, though it appears to be inhibited by low soil temperatures (CEC RSA, 2010 as cited in the CEC RSA, 2010).

Threats to Couch's spadefoot include loss of habitat from urbanization, agriculture, and impacts from off-highway vehicles, which can destroy potential pool habitat. There are also indications that the low-frequency sound created by off-highway vehicles may create emergence cues, and result in emergence during poor environmental conditions (Jennings and Hayes, 1994 as cited in the CEC RSA, 2010). Emergence also may be triggered by construction vehicle noise (Dimmitt, pers. comm. as cited in the CEC RSA, 2010).

No Couch's spadefoot toads were observed during surveys; however, because of the short time this species is above ground, and because the surveys were not conducted during the proper season (i.e., after summer rains), the lack of observations does not suggest the species is absent from the project site. The closest known record for this species is from Dimmitt (1977 as cited in the CEC RSA, 2010) from a breeding pond in a borrow pit near the east end of Chuckwalla Road, south of I-10 (about 15 miles east of the project site). The project area is west of the range for this species as described in the NECO plan and Jennings and Hayes (1994) as cited in the CEC RSA, 2010; however, Dimmitt (1977 as cited in the CEC RSA, 2010) indicates that the Palen Mountains and surrounding bajadas could support marginal populations and should be surveyed. Couch's spadefoot toads could potentially occur wherever friable soils occur in the project site, and breeding habitat could occur wherever there is the potential for sustained ponding.

Couch's spadefoot toads require substrates capable of sustaining ponding for at least nine days (Morey, 2005), but the general characterization of soils at the project (?) site as permeable is insufficient to eliminate the possibility of suitable habitat occurring onsite. Micro-site characteristics within the landscape, that may not be detectable other than by specific surveys, may allow for ponding and provide suitable breeding habitat. Review of aerial photographs of the project area did not identify any areas of obvious ponding. In comparing site aerials to aerial photographs of a known historical location (i.e., the intersection of Wiley Well Road and I-10) and from limited reconnaissance surveys, it appears that there is limited potential for breeding habitat at the project site. Adult dispersal distance is largely unknown (Dimmitt, pers. comm.); if breeding ponds occur off-site (such as the Palen Lake area) within adult dispersal distance, adults could occur on the project site wherever there are friable soils suitable for burrowing. Based on review of an analysis of the ponding potential on the project site, it appears that the site does not have the potential due to the permeability of site soils or show evidence of sustained ponding, and that the species is not expected to occur on the project site (AECOM, 2010t as cited in the CEC RSA, 2010). Consequently, it appears that there is limited potential for Couch's spadefoot toad breeding habitat on the project site.

3.23.5 Western Burrowing Owl

The western burrowing owl inhabits arid lands throughout much of the western United States and southern interior of western Canada (Haug et al., 1993 as cited in the CEC RSA, 2010) and is typically a year-round resident in much of California (Gervais et al., 2008 as cited in the CEC RSA, 2010).

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by California ground squirrels, kit fox, desert tortoise, and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering habitats. They often return to burrows used in previous years, especially if they were successful at reproducing there in previous years (Gervais et al., 2008 as cited in the CEC RSA, 2010) (Figure 3.23-6). The southern California breeding season (defined as from pair bonding to fledging) generally occurs from February to August with peak breeding activity from April through July (Haug et al., 1993 as cited in the CEC RSA, 2010).

In the Colorado Desert, western burrowing owls generally occur at low densities in scattered populations, but they can be found in much higher densities near agricultural lands, including along the lower Colorado River, where rodent and insect prey tend to be more abundant (Gervais et al., 2008 as cited in the CEC RSA, 2010). Western burrowing owls tend to be opportunistic feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet. Small mammals, especially mice and voles (*Microtus, Peromyscus* and *Mus spp.*), also are important food items for this species. Other prey animals include small reptiles and amphibians, young cottontail rabbits, bats, and birds such as sparrows and horned larks. Consumption of insects increases during the breeding season (Haug et al., 1993 as cited in the CEC RSA, 2010).

Threats to burrowing owls include habitat modification and destruction of ground squirrel burrows. Other threats include pesticide accumulation, burrow destruction from farming practices and canal and road maintenance, roadside shooting, and direct mortality from squirrel poisons (BLM CDD, 2002; Gervais et al., 2008).

Phase I through III protocol-level surveys of part of the Project Disturbance Area (except the substation) were conducted in spring and summer 2009. A habitat assessment was completed for this site in fall 2009. Part of the northern end of the Project Disturbance Area is densely covered in Sahara mustard; other than this area, the entire Project Disturbance Area is suitable western burrowing owl habitat. Two pairs with juveniles and four active burrows with sign were identified during 2009 protocol surveys (Solar Millennium, 2009b, Appendix F, Attachment J as cited in the CEC RSA, 2010). Survey results from 2010 indicate that a total of 4 burrowing owls with active burrows have been observed within the Project Disturbance Area to date (Solar Millennium, 2010m, Table 6 as cited in the CEC RSA, 2010).

3.23.6 Golden Eagle

Golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668a - d, as amended), and are typically year-round residents throughout most of their western United States range. They breed from late January through August with peak activity March through July (Kochert et al., 2002 as cited in the CEC RSA, 2010). Migratory patterns are usually fairly local in California where adults are relatively sedentary, but dispersing juveniles sometimes migrate south in the fall. This species is generally considered to be more common in southern California than in the northern part of the state (USFS, 2008 as cited in the CEC RSA, 2010).

Habitats for this species typically include rolling foothills, mountain areas, and deserts. Golden eagles need open terrain for hunting and prefer grasslands, deserts, savanna, and early successional stages of forest and shrub habitats. Golden eagles primarily prey on lagomorphs and rodents but will also take other mammals, birds, reptiles, and some carrion (Kochert et al., 2002 as cited in the CEC RSA, 2010). This species prefers to nest in rugged, open habitats with canyons and escarpments, often with overhanging ledges and cliffs or large trees used as cover. (Figures 3.23-7 and 3.23-8)

The status of golden eagle populations in the United States is not well known, although there are indications that populations may be in decline (USFWS, 2009b, Kochert et al., 2002 as cited in the CEC RSA, 2010). Accidental death from collision with man-made structures, electrocution, gunshot, and poisoning are the leading causes of mortality for this species, and loss and degradation of habitat from agriculture, development, and wildfire continues to put pressure on golden eagle populations (Kochert et al., 2002; USFWS, 2009b as cited in the CEC RSA, 2010).

In the absence of interference from humans, breeding density is determined by either prey density or nest site availability, depending upon which is more limiting (USFWS, 2009b as cited in the CEC RSA, 2010). A compilation in Kochert (2002 as cited in the CEC RSA, 2010) of breeding season home ranges from several western United States studies showed an average home range of 20–33 square kilometers (7.7 to 12.7 square miles) that ranged from 1.9 to 83.3 square kilometers (0.7 to 32.2 square miles). In San Diego, a study of 27 nesting pairs found breeding ranges to be an average of 36 square miles with a range from 19 to 59 square miles (Dixon, 1937 as cited in the CEC RSA, 2010). Other studies from within and outside the United States include ranges from 9 to 74.2 square miles (McGahan, 1968; Watson et al., 1992 as cited in the CEC RSA, 2010 [range of 14.7 to 26.1 pairs per 1,000 square kilometers, or 386 square miles]). The USFWS issued an Environmental Assessment (EA) and Implementation Guidance for take permits under the Bald Eagle and Golden Eagle Protection Act in November 2009 (USFWS, 2009b as cited in the CEC RSA, 2010).

In spring 2010, golden eagle helicopter surveys were conducted to cover the project area, as well as a 10-mile radius from the PPSP boundaries. Three other proposed solar projects (Solar Millennium, 2010u; TTEC, 2010a as cited in the CEC RSA, 2010) were also surveyed at this time. The surveys covered 11 mountain ranges between and around Blythe and Desert Center (TTEC, 2010a as cited in the CEC RSA, 2010) and were conducted following the USFWS's February 2010 Interim Golden Eagle Inventory and Monitoring Protocols (Pagel et al., 2010 as cited in the CEC RSA, 2010). The surveys found two active golden eagle nests within one territory, approximately 7 miles southwest of the project site in the Chuckwalla Mountains. Additionally, three inactive nests were located approximately 6 miles southwest of the site in the Chuckwalla Mountains; two of these nests were associated with the territory discussed above, the other is likely associated with a territory located further south of the project site (Solar Millennium, 2010u as cited in the CEC RSA, 2010).

3.23.7 Loggerhead Shrike

Loggerhead shrikes are small predatory birds that are uncommon residents throughout most of the southern portion of their range, including southern California. In southern California, they are generally much more common in interior desert regions than along the coast (Humple, 2008 as cited in the CEC RSA, 2010). Loggerhead shrikes initiate their breeding season in February and may continue with raising a second brood as late as July; they often re-nest if their first nest fails or to raise a second brood (Yosef, 1996 as cited in the CEC RSA, 2010).

This species can be found within lowland, open habitat types, including creosote scrub and other desert habitats, sage scrub, non-native grasslands, chaparral, riparian, croplands, and areas characterized by open scattered trees and shrubs. Fences, posts, or other potential perches are typically present. In general, loggerhead shrikes prey upon large insects, small birds, amphibians, reptiles, and small rodents over open ground within areas of short vegetation, usually impaling prey on thorns, wire barbs, or sharp twigs to cache for later feeding (Yosef, 1996). Loss of habitat to agriculture, development, and invasive species is a major threat; this species has shown a significant decline in the Sonoran Desert (Humple, 2008 as cited in the CEC RSA, 2010).

The entire Project Disturbance Area contains suitable habitat for loggerhead shrike. This species, including an adult with fledglings, was observed on the project site, though it appeared less common on the project site than in surrounding areas (Solar Millennium, 2009a-AFC Volume II, Appendix F, Attachment H as cited in the CEC RSA, 2010). Loggerhead shrikes also were observed within the project area during spring 2010 surveys (Solar Millennium, 2010k as cited in the CEC RSA, 2010).

3.23.8 Le Conte's Thrasher

In California, Le Conte's thrasher is a resident in the San Joaquin Valley and the Mojave and Colorado Deserts (Figure 3.23-9). This pale gray bird occurs in desert flats, washes and alluvial fans with sandy and/or alkaline soil and scattered shrubs. It rarely occurs in monotypic creosote scrub habitat, because creosote bush is unable to support a nest, or in massive Sonoran Desert woodlands (Prescott, 2005 as cited in the CEC RSA, 2010). Preferred nest substrate includes thorny shrubs and small desert trees. Breeding activity occurs from January to early June, with a peak from mid-March to mid-April (BLM CDD, 2002 as cited in the CEC RSA, 2010). Le Conte's thrashers forage for food by digging and probing in the soil. They eat arthropods, small lizards and snakes, and seeds and fruit; the bulk of their diet consists of beetles, caterpillars, scorpions, and spiders.

This species was observed during project surveys, including avian surveys conducted over a period of four weeks in the spring of 2009. Because the Sonoron cresosote bush scrub in this area is fairly monotypic, suitable habitat for this species in the Project Disturbance Area is confined to the 141 acres of desert dry wash woodland. The closest CNDDB record for this species is about 3 miles south of the project site (CNDDB, 2010 as cited in the CEC RSA, 2010).

3.23.9 California horned lark

The California horned lark is found throughout California except the north coast, and is less common in mountainous areas. This species prefers open areas that are barren or with short vegetation including deserts, brushy flats, and agricultural areas. Eggs are laid March to early June, and this species frequently lays a second clutch.

The project site contains suitable habitat for this species, especially in creosote bush scrub. This species was observed frequently in the Project Disturbance Area during surveys. There are numerous CNDDB (2010 as cited in the CEC RSA, 2010) records for this species in western Riverside County.

3.23.10 Prairie Falcon

The prairie falcon inhabits dry environments in the North American west from southern Canada to central Mexico. It is found in open habitat from annual grasslands to alpine meadows at all elevations up to 3,350 m, but is associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. They require cliffs or bluffs for nesting though will sometimes nest in trees, on power line structures, on buildings, or inside caves or stone quarries. Ground squirrels and horned larks are the primary food source, but prairie falcon will also prey on lizards, other small birds, and small rodents.

Prairie falcons were observed several times during project surveys both as flyovers and perched in the Project Disturbance Area. The entire Project Disturbance Area (approximately 4,024 acres) contains suitable foraging habitat for this species. The project site does not contain suitable nesting habitat, although adjacent mountains may. There are numerous CNDDB (2010 as cited in the CEC RSA, 2010) records in the region for this species, including eight records from Little Maria Mountains to the northeast (1977 as cited in the CEC RSA, 2010) and the Chuckwalla Mountains to the southwest (1978 as cited in the CEC RSA, 2010). During golden eagle Phase 2 nest surveys performed jointly for neighboring proposed energy projects, a pair of prairie falcons was documented to be nesting on the same cliff on which the golden eagle nest was located in the Palen Mountains (TTEC, 2010a as cited in the CEC RSA, 2010).

3.23.11 American Badger

American badgers once were fairly widespread throughout open grassland habitats of California. Badgers are an uncommon permanent resident with a wide distribution across California, except in the North Coast area. The American badger is a resident species and is most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers generally are associated with treeless regions, prairies, parklands, and cold desert areas (Zeiner et al., 1990). Badgers inhabit burrows and often predate and forage on other small mammals that inhabit burrows, as evidenced by claw marks along the edges of existing burrows. Most of the CNDDB records from the Palo Verde Valley area of Riverside County are prior to 1960; the closest to the project site is northwest of Palo Verde approximately 12 miles southeast of the project site (CNDDB, 2010 as cited in the CEC RSA, 2010).

The entire Study Area is considered suitable habitat for badgers (Figure 3.23-10). Badger sign was found during spring 2009 field surveys; burrow predation evidence by badgers was found throughout the Project Disturbance Area habitats and Study Area. Surveyors observed five badger dens and over 10 small mammal burrows showing evidence of predation by badgers (Solar Millennium, 2009b as cited in the CEC RSA, 2010). In addition, a badger skull was observed within the Study Area, south of I-10 (Solar Millennium, 2009b as cited in the CEC RSA, 2010). The entire Study Area is considered suitable habitat for badgers.

3.23.12 Desert Kit Fox

Desert kit fox is an uncommon to rare permanent resident of arid regions of the southern California deserts. Kit fox occur in annual grasslands, or grassy open, arid stages of vegetation dominated by scattered herbaceous species. Kit fox occur in association with their prey base which is primarily cottontail rabbits, ground squirrels, kangaroo rats and various species of insects, lizards, or birds (Zeiner et al., 1990 as cited in the CEC RSA, 2010). Title 14 of the California Code of Regulations, Section 460, stipulates that desert kit fox may not be taken at any time. Kit fox dens are used as shelter, escape, cover, and reproduction and are vital to the survival of the species.

Desert kit fox burrows, burrow complexes and scat were observed throughout the Study Area within desert wash and upland scrub habitats during spring 2009. The entire Study Area is suitable habitat (Figure 3.23-10). Approximately 71 kit fox burrows and burrow complexes were recorded within the Study Area, most of which occur in the Project Disturbance Area (Solar Millennium, 2009a as cited in the CEC RSA, 2010). Kit fox scat was observed within the transmission line Disturbance Area in Fall 2009, and a kit fox burrow was observed there in spring 2009 (Solar Millennium, 2009b as cited in the CEC RSA, 2010). During spring 2010 field surveys, two kit fox complexes were found in the Project Disturbance Area and four burrow complexes were found in the buffer area (Solar Millennium, 2010k as cited in the CEC RSA, 2010). The entire Study Area is suitable habitat for desert kit fox.

3.23.13 Nelson's Bighorn Sheep

Nelson's bighorn sheep includes bighorns from the Transverse Ranges through most of the desert mountain ranges of California, Nevada, northern Arizona to Utah. Essential habitat for bighorn sheep includes steep, rocky slopes of desert mountains, termed "escape terrain." Their agility on steep rocky terrain is an adaptation used to escape predators such as coyotes, eagles, and cougars (Wehausen, 1992 as cited in the CEC RSA, 2010). Surface water is another element of desert bighorn habitat considered essential to population health. Male and female bighorn sheep inhabiting desert ecosystems can survive without consuming surface water (Krausman et al., 1985 as cited in the CEC RSA, 2010) although males appear to drink infrequently in many situations; however, there are no known large populations of bighorn sheep in the desert region that lack access to surface water. In the spring, when annual plants are available, bighorn tend to disperse downhill to bajadas and alluvial fans to forage. Desert bighorn have a long lambing season that can begin in December and end in June in the Mojave Desert, and a small percentage of births commonly occur in summer as well (Wehausen, 1992 as cited in the CEC RSA, 2010). Lambing season dates for this part of the Colorado Desert would be similar to those reported above.

Over the past 140 years, bighorn sheep have suffered considerable population declines throughout their range and meta-populations have been fragmented by roads and other barriers, with a resulting decline in genetic diversity (Bleich et al., 1996, Epps et al., 2005 as cited in the CEC RSA, 2010). Disease, sometimes brought about by contacts with domestic sheep, drought and predation, interacting with other anthropogenic factors also may have contributed to declines in bighorn sheep populations (Wehausen, 2005 as cited in the CEC RSA, 2010). Loss of surface water sources also may diminish the viability of existing populations (Wehausen, 2005 as cited in the CEC RSA, 2010).

Two metapopulations of bighorn sheep occur within the NECO planning area, the Southern Mojave and Sonoran. Within these metapopulations, there are smaller, isolated subpopulations of bighorn sheep known as demes. Nine demes occur in the Sonoran metapopulation (BLM CDD, 2002 as cited in the CEC RSA, 2010). The NECO Plan addresses the conservation of the bighorn sheep through the designation of Bighorn Sheep Wildlife Habitat Management Areas (WHMAs), which overlay the entire range of their occurrence and movement corridors. See Figure 3.23-11. Bighorn sheep metapopulations have been fragmented by highways, roads, railroads, and aqueducts primarily by the construction of I-10 and Interstate 40 which are major barriers to bighorn sheep movements. Transportation corridors of Highways 66, 62, 177, 95, and 78, the AT&SF Railroad (parallel to Old Highway 66) and the Eagle Mountain Railroad (scheduled for reactivation) inhibit bighorn sheep movements between demes. Nevertheless, bighorn sheep are known to cross these and other linear features such as transmission lines and fences.

The project site is located south of occupied Bighorn sheep WHMAs in the Palen, Granite, and Coxcomb Mountains (BLM CDD, 2002 as cited in the CEC RSA, 2010). Recent surveys also suggest bighorn sheep may occur in the Little Maria Mountains, farther northeast of the Project area (Wehausen, 2009 as cited in the CEC RSA, 2010). The CNDDB records for this species from the Project area indicate that bighorn sheep disperse through these mountain ranges typically whenever forage and water conditions are suitable.

No sign or evidence of Nelson's bighorn sheep were found during field surveys performed within the Study Area; however, bighorn sheep have been documented in the Chuckwalla Mountains southwest of the project site and the Palen, Granite, Coxcomb, and Eagle mountain ranges to the north, west, and east. Six rams were observed in the Coxcomb Mountains during Phase 2 golden eagle surveys performed jointly for various energy projects during 2010 (Tetra Tech, 2010a as cited in the CEC RSA, 2010). The Study Area does not occur in a known movement corridor as identified in the NECO. All vegetation communities within the Study Area are considered suitable for bighorn sheep.

3.23.14 Burro Deer

Burro deer is a subspecies of mule deer (*Odocoileus hemionus*) found in Colorado region of the Sonoran Desert near the Colorado River and within desert dry wash woodland communities (Figure 3.23-12). Some burro deer are resident along the Colorado River, but a significant portion move into desert areas in response to increases in water and forage. During hot summers, water is critical, and burro deer concentrate along the Colorado River or the Coachella Canal where water developments have been installed and where microphyll woodland is dense and provides good forage and cover. With late summer thundershowers and cooler temperatures, deer move away from the Colorado River and Coachella Canal into larger washes or wash complexes in the foothills and nearby mountains (BLM CDD, 2002 as cited in the CEC RSA, 2010).

During spring 2009 and December 2009 field surveys, deer scat and tracks were observed in rocky substrate and deep washes including the western, central, and eastern desert washes that transect the project site. Deer sign was found within the washes and 150 foot-wide box culverts that convey the washes underneath I-10 (Solar Millennium, 2009a; AECOM, 2009a as cited in the CEC RSA, 2010). Burro deer are known to use a culvert associated with the western-most project area wash to access a water source at a nearby orchard. Other species sign observed in these washes include coyote (*Canis latrans*), cottontail rabbit (*Sylvilagus audubonii*), bobcat (*Lynx rufus*), badger, and kit fox. The entire project site supports suitable habitat for burro deer.

3.23.15 Other Special Status Wildlife

Table 3.23-2 lists the other special status wildlife that were not detected and not expected in the Study Area. These additional species were considered to have a lower potential for occurrence on the project site than the species discussed above because the general or micro-habitats known to support them were not found on the site, and/or because there are no known occurrences in the project vicinity.

TABLE 3.23-2
SPECIAL-STATUS WILDLIFE WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Birds		
Bendire's thrasher *Toxostoma bendirei*	Bendire's thrashers are known in California from scattered locations in Kern, Inyo, San Bernardino, and Riverside Counties. This species is a summer resident in southeastern California, and arrives at breeding grounds from mid-March through May, and departs by late August. This species favors open grassland, shrubland, or woodland with scattered shrubs, primarily in areas that contain large cholla, Joshua tree, Spanish bayonet, Mojave yucca, palo verde, mesquite, catclaw, desert-thorn, or agave. The status of populations of this species is poorly understood, but threats are believed to be loss of habitat due to urbanization, harvesting of yucca and Joshua trees, overgrazing, and off-road vehicle activity. In parts of the range, grazing may increase habitat suitability by increasing the area with scattered junipers.	The desert dry wash vegetation community provides potential habitat for this species (141 acres), although this species was not observed during surveys. There are CNDDB (2010 as cited in the CEC RSA, 2010) records from near Desert Center, approximately 8 miles west of the project site, from 2004.
Black-tailed gnatcatcher *Polioptila melanura*	A year round resident in southwestern United States and central and northern Mexico, in California the black-tailed gnatcatcher is found in the southeast desert wash habitat from Palm Springs and Joshua Tree National Park south, and along the Colorado River. It is now rare in eastern Mojave Desert north to the Amargosa River, Inyo County. This species nests primarily in wooded desert wash habitat, but also occurs in creosote scrub habitat during the non-breeding season.	Based on a review of the vegetation community descriptions provided by the Applicant, the project site contains little, if any, of the dense scrub habitat preferred by this species. They are known from the area, including from McCoy Spring, Palen Valley, and Chuckwalla Well (Fitton, 2008 as cited in the CEC RSA, 2010). The closest occurrence based on the CNDDB (2010 as cited in the CEC RSA, 2010) is from 1977 and is approximately 16.5 miles east of the project site.
Crissal thrasher *Toxostoma crissale*	Crissal thrashers are non-migratory residents ranging from southern Nevada and southeastern California to western Texas and central Mexico. This species prefers habitats characterized by dense, low scrubby vegetation, which, at lower elevations, includes desert and foothill scrub and riparian brush. Nests of this species typically consist of an open cup of twigs, lined with finer vegetation, and are placed in the middle of a dense shrub.	Based on a review of the vegetation community descriptions provided by the Applicant, the project site contains little, if any, of the dense scrub habitat preferred by this species. They are known from the area, including from McCoy Spring, Palen Valley, and Chuckwalla Well (Fitton, 2008 as cited in the CEC RSA, 2010). The closest occurrence based on the CNDDB (2010 as cited in the CEC RSA, 2010) is from 1977 and is approximately 16.5 miles east of the project site.
Ferruginous hawk *Buteo regalis*	Ferruginous hawks do not breed in California, but are winter residents and in California are most common in grassland and agricultural areas in the southwest. Ferruginous hawks are found in open terrain from grasslands to deserts, and are usually associated with concentrations of small mammals. Threats to this species include loss of wintering habitat from urbanization and cultivation.	The project site contains suitable wintering habitat for this species. There are nine CNDDB (2010 as cited in the CEC RSA, 2010) records for this species in western Riverside County.
Gila woodpecker *Melanerpes uropygialis*	The Gila woodpecker's range is limited to a small area of southwestern United States and northwestern Mexico. In California, this species is found only along the Colorado River and in small numbers in Imperial County. In southeastern California, Gila woodpeckers formerly were associated with desert washes extending up to 1 mile from the Colorado River. Currently, they are found only in riparian areas along the Colorado River.	In California, this species is currently known only from the Colorado River; therefore this species is not expected in the project site. The project site does not contain suitable nesting habitat for this species. The closest CNDDB (2010 as cited in the CEC RSA, 2010) record for this species is a 1986 record east of the project site at the Colorado River.

TABLE 3.23-2 (Continued)
SPECIAL-STATUS WILDLIFE WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Birds (cont.)		
Gilded flicker *Colaptes chrysoides*	In California, the gilded flicker is known from the southeast; habitat includes stands of giant cactus, Joshua tree, and riparian groves of cottonwoods and tree willows in warm desert lowlands and foothills. Until the mid-1990's, this species was considered a subspecies of northern flicker (*C. atratus*). This species nests primarily in cactus, but also will use cottonwoods and willows of riparian woodlands. This species may be nearly extinct in California.	This species is not expected to regularly use the project site due to lack of suitable habitat. The closest CNDDB (2010 as cited in the CEC RSA, 2010) records for this species are along the Colorado River.
Mountain plover *Charadrius montanus*	Mountain plovers do not breed in California, but are winter visitors primarily from September to mid-March. In California they are found in the Central Valley, Antelope Valley, San Jacinto Valley, Imperial Valley, and Palo Verde Valley. Mountain plover habitat includes short-grass prairie or their equivalents, and in southern California deserts are associated primarily with agricultural areas, though use of these areas is suspected to be because of loss of native grassland and playa habitats.	This species may use the dry lakebed and nearby agricultural areas as winter habitat. The closest CNDDB (2010 as cited in the CEC RSA, 2010) record for this species is in Imperial County at the southern end of the Salton Sea.
Northern harrier *Circus cyaneus*	In western North America, the northern harrier breeds from northern Alaska south to Baja California, Mexico. This species does not commonly breed in desert regions of California, where suitable habitat is limited, but winters broadly throughout California in areas with suitable habitat. Northern harriers forage in open habitats including deserts, pasturelands, grasslands, and old fields.	The project site contains suitable wintering habitat for the northern harrier, and this species was observed during project site surveys (Solar Millennium, 2009a as cited in the CEC RSA, 2010). There are CNDDB (2010 as cited in the CEC RSA, 2010) nesting records for this species in eastern Riverside County.
Peregrine falcon *Falco peregrines*	The Peregrine falcon's year-round range includes coastal and northwestern California and the Sierra Nevada and other California mountains. Additionally, this species winters inland throughout the Central Valley and in northeastern California. They are rare in the arid southeast, but they occur and are suspected to breed in the lower Colorado River Valley. Peregrine falcons require open habitat for foraging, and prefer breeding sites near water. Nesting habitat includes cliffs, steep banks, dunes, mounds, and some human-made structures.	This species may forage on the project site and nest in nearby mountains, but was not observed on the project site during project surveys. There are no CNDDB (2010 as cited in the CEC RSA, 2010) records for Riverside County.
Purple martin *Progne subis*	The historical breeding range of the purple martin includes southern California, though populations have shrunk dramatically. Neither the historical or current breeding range, however, includes the Colorado Desert. Purple martins habitat requirements include adequate nest sites and availability of large aerial insects, and therefore are most abundant near wetlands and other water sources. Threats to this species include loss of large tree and snags and competition from European starlings.	This species was observed migrating through the project site, but is not expected to extensively use the project site. There are six CNDDB (2010 as cited in the CEC RSA, 2010) records for this species from western Riverside County, the most recent of which include nesting records from 1983 and 1993.
Short-eared owl *Asio flammeus*	Short-eared owls breed through much of northern North America, and are year-round residents in some areas of California. Historically, this species occurred throughout much of California, west of the southern deserts, in low numbers. Currently, small populations breed in regularly in the Great Basin and in the Sacramento/San Joaquin River Delta area, but sporadically in other parts of its former range. Short-eared owls require open country that supports small mammal	The project site contains suitable wintering habitat for the short-eared owl. Although this species was not observed during surveys for the project, it was observed during surveys for a nearby proposed energy facility immediately west of the McCoy Mountains. There are no Riverside County CNDDB (2010 as cited in the CEC RSA, 2010) records for this species.

TABLE 3.23-2 (Continued)
SPECIAL-STATUS WILDLIFE WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Birds (cont.)		
Short-eared owl *Asio flammeus* (cont.)	populations, and that also provides adequate vegetation to provide cover for nests. This includes salt- and freshwater marshes, irrigated alfalfa or grain fields, and ungrazed grasslands and old pastures.	
Swainson's hawk *Buteo swainsoni*	Swainson's hawks require large areas of open landscape for foraging, including grasslands and agricultural lands that provide low-growing vegetation for hunting and high rodent prey populations. Swainson's hawks typically nest in large native trees such as valley oak, cottonwood, walnut, and willow, and occasionally in nonnative trees, such as eucalyptus within riparian woodlands, roadside trees, trees along field borders, isolated trees, small groves, and on the edges of remnant oak woodlands. While there are historical breeding records of this species from the Colorado Desert, this species now is known from southern California only as a spring and fall migrant. This reduction in breeding range is believed to be from loss of nesting habitat.	The project site may provide foraging habitat for migrating individuals, and this species was observed in the project site during surveys. There are no CNDDB (2010 as cited in the CEC RSA, 2010) records for this species in Riverside County.
Vaux's swift *Chaetura vauxi*	This species is not known to breed in Riverside County or elsewhere in southern California. Very few nests have been found so their breeding range has been inferred from sightings of birds flying over potential nesting areas during their nesting season, in June and July. Vaux's swifts prefer to nest in the hollows formed naturally inside of large old conifer trees, especially snags, which are entirely lacking from the project site.	This species was observed during surveys, but occurrences are expected to be of migrants, only.
Vermilion flycatcher *Pyrocephalus rubinus*	Vermilion flycatchers are rare breeders or residents in localized areas of southern California, including along the Colorado River. They are usually found near water in arid scrub, farmlands, parks, golf courses, desert, savanna, cultivated lands, and riparian woodlands; nesting substrate includes cottonwood, willow, and mesquite.	Within the project vicinity, occurrences of this species are limited to the Colorado River. This species is not expected in the project site. The closest CNDDB (2010 as cited in the CEC RSA, 2010) records include a 1983 record from the Blythe golf course.
Yellow warbler *Dendroica petechia*	Yellow warblers historically bred throughout much of California except for high elevations, the Colorado Desert, and most of the Mojave Desert. Breeding abundance for this species has declined in much of California, as has the breeding range, especially in the Central Valley and parts of Owens Valley. In southeastern California, this species is known only from the lower Colorado River Valley from the middle of San Bernardino County through Riverside and Imperial Counties. Currently, this species no longer breeds in much of the Riverside County segment of the lower Colorado River Valley. This species commonly uses wet, deciduous thickets for breeding, and seeks a variety of wooded, scrubby habitats in winter.	This species was not observed during surveys, and is not expected to nest in the project site due to lack of suitable habitat. The closest CNDDB (2010 as cited in the CEC RSA, 2010) records for this species are two 1986 records east of the project site at the Colorado River.
Yellow-breasted chat *Icteria virens*	The yellow-breasted chat occurs as a summer resident and migrant in California. In the southeastern California, the yellow-breasted chat breeds primarily in scattered locations in Owen's Valley and the Mojave, from the Salton Sea, and from the lower Colorado River Valley. This species occupies shrubby riparian habitat with an open canopy, and will next in non-native species, including tamarisk. Threats to this species include loss of riparian habitat, and, it is suspected, pressure from cowbird parasitism.	In this region, this species is associated with the Colorado River only. The project site does not contain suitable habitat for this species. CNDDB (2010 as cited in the CEC RSA, 2010) records in the region are associated with the Salton Sea or the Colorado River. The closest CNDDB records for this species are two 1986 records east of the project site at the Colorado River.

TABLE 3.23-2 (Continued)
SPECIAL-STATUS WILDLIFE WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Mammals		
Arizona myotis *Myotis occultus*	This species has been found from southeastern California through Arizona, New Mexico, and south into Chihauhau, Mexico. Arizona myotis is most commonly known from conifer forests from 6,000 to 9,000 feet in elevation, although maternity roosts are known from much lower elevations including areas along the Colorado River in California.	This species is not expected to occur due to lack of coniferous forests and low elevation of the Study Area. The closest CNDDB (2010 as cited in the CEC RSA, 2010) record is a historical occurrence from 1945 approximately 10 miles south of the Study Area near the town of Ripley.
Big-free tailed bat *Nyctinomops macrotis*	This species ranges from most of South America northward to include Mexico, Arizona, New Mexico, southern and western Texas, southern California, southeastern Nevada, southern Utah, and north and western Colorado from generally sea level to 8,000 feet in elevation. This species occurs in desert shrub, woodlands, and coniferous forests. It roosts mostly in the crevices of rocks although big free-tailed bats may roosts in buildings, caves, and tree cavities	This species has the potential to roost and forage within the project area. The nearest occurrences for this species in Riverside County are from the vicinity of Palm Springs and Joshua Tree National Park (CNDDB 2010 as cited in the CEC RSA, 2010). A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a as cited in the CEC RSA, 2010).
California leaf-nosed bat *Macrotus californicus*	California leaf-nosed bat is a species of concern and a BLM Sensitive species; it is covered under the NECO plan. California leaf-nosed bats occur in the deserts of California, southern Nevada, Arizona and south to northwestern Mexico. In California, they now are found primarily in the mountain ranges bordering the Colorado River Basin. In California, the two largest roosts (each sheltering 1,500 bats during winter months) are in mines in extreme southeastern California. This species depends on either caves or mines for roosting habitat. All major maternity, mating, and overwintering sites are in mines or caves (BLM CDD, 2002 as cited in the CEC RSA, 2010). Radio-telemetry studies of Macrotus in the California desert show that the California leaf-nosed bat forage almost exclusively among desert wash vegetation within 10 km of their roost (WBWG, 2005-2009 as cited in the CEC RSA, 2010).	All habitats within the Project Disturbance Area are suitable habitats for this species. A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a as cited in the CEC RSA, 2010). There are several CNDDB records in the vicinity of the Study Area. The nearest record is from 1993 near the McCoy Mountains area in creosote bush scrub habitat approximately where approximately 300 adults were observed roosting (CNDDB, 2010 as cited in the CEC RSA, 2010).
Cave myotis *Myotis velifer*	The cave myotis occurs from western Texas, to southern Nevada, southeastern California (only along the Colorado River), southward into Mexico, and is also widely distributed in Arizona. This species is found primarily at lower elevations (the Sonoran and Transition life zones) of the arid southwest in areas dominated by creosote bush, palo verde, and cactus. This species is a “cave dweller” and caves are the main roosts although this species may also use mines, buildings, and bridges for roosts.	This species has a potential to occur within the Study Area, more likely as a foraging species than a roosting bat species. The nearest CNDDB record for this species is from 2002 near the I-15 bridge over the Colorado River in Blythe where individual bats of this species were detected acoustically during April 2002 (CNDDB, 2010 as cited in the CEC RSA, 2010).
Colorado Valley woodrat *Neotoma albigula venusta*	This species occurs from southern Nevada, southeastern California, northeastern Baja California, to western Arizona. Colorado Valley woodrats are found in a variety of habitats including low desert, pinyon-juniper woodlands, and desert-transition chaparral. Suitable habitat elements for this species include washes where organic debris gathers, areas of prickly pear cactus and mesquite, rocky areas, and crevices in boulders which are used for cover and nest sites.	This species is not expected to occur at the project site due to coarse soils and disturbance of the site from past agricultural activities. The nearest CNDDB record is from 1934 near Blythe (CNDDB, 2010 as cited in the CEC RSA, 2010).

TABLE 3.23-2 (Continued)
SPECIAL-STATUS WILDLIFE WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Mammals (cont.)		
Hoary bat *Lasiurus cinereus*	Hoary bat is the most widespread of North American bats and is highly associated with forested habitats in the west. Hoary bat roosts usually are located at the edge of a clearing, although more unusual roosting sites have been reported in caves, beneath rock ledges, woodpecker holes, squirrel nests, and building sides.	This species may occur in the area as a forage and roost habitat occurs within the project area. The closest CNDDB (2010 as cited in the CEC RSA, 2010) record is a historical occurrence approximately from the town of Neighbors during 1919. A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a as cited in the CEC RSA, 2010).
Pallid bat *Antrozous pallidus*	The pallid bat is a California species of concern and a BLM Sensitive species that is covered under the NECO plan. Pallid bats inhabit low elevation (less than 6,000 feet) rocky, arid deserts and canyonlands, shrub/steppe grasslands, but also occur in higher elevation coniferous forests, greater than 7,000 feet in elevation. This species is most abundant in xeric landscapes including the Great Basin, Sonoran, and Mojave deserts (WBWG, 2005-2009 as cited in the CEC RSA, 2010). Pallid bats are known from Cuba, Mexico, and throughout the southwestern and western United States. Population trends are not well known, but there are indications of decline. Pallid bats roost alone, in small groups (2 to 20 bats), or gregariously (100s of individuals). Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees with exfoliating bark, and various human structures such as bridges, barns, porches, bat boxes, and human-occupied as well as vacant buildings (WBWG, 2005-2009 as cited in the CEC RSA, 2010).	This species has a potential to roost and forage within the project area. A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a as cited in the CEC RSA, 2010). Anabat/Sonobat surveys were not conducted in conjunction of these surveys which allows for more precise identification of bat species based on the recording of echolocation frequencies. The nearest CNDDB record is approximately 5 miles southeast of the project site (CNDDB, 2010 as cited in the CEC RSA, 2010).
Pocketed free-tailed bat *Nyctinomops femorosaccus*	Pocketed free-tailed bat is a California species of concern. This species occurs in western North America, from southern California, central Arizona, southern New Mexico, western Texas, south into Mexico and Baja, California (WBWG, 2005-2009). Despite only a limited number of records, pocketed free-tailed bats are known to occur in the desert from March through August, when they then migrate out of the area. In California, they are found primarily in creosote bush and chaparral habitats in proximity to granite boulders, cliffs, or rocky canyons.	This species has a potential to roost and forage within the project site based on what is understood of its habitat requirements and roosting habits. The nearest CNDDB record for this species is from 2002 near the I-15 bridge over the Colorado River in Blythe. Individual bats of this species were detected acoustically during April 2002 (CNDDB, 2010). A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a).
Spotted bat *Euderma maculatum*	This species is known from all the states west of and including Montana, Wyoming, Colorado, New Mexico and Texas. Although broadly distributed, this species is rarely common, but may occur locally from southern British Columbia, northern Arizona, Arizona/Utah border, and western Texas from below sea level to 8,100 feet above mean sea level. Spotted bats occur in arid, low desert habitats to high elevation conifer forests and prominent rock features appear to be a necessary feature for roosting.	This species has a potential to roost and forage within the project site based on what is understood of its habitat requirements and roosting habits. The nearest CNDDB record is a historical occurrence from 1907 in the Colorado Desert near Mecca (CNDDB, 2010 as cited in the CEC RSA, 2010). A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a as cited in the CEC RSA, 2010).

TABLE 3.23-2 (Continued)
SPECIAL-STATUS WILDLIFE WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE PROJECT STUDY AREA

Species	Habitat Requirements and Geographic Range	Potential to Occur or Presence On Site
Mammals (cont.)		
Townsend's big-eared bat *Corynorhinus townsendii*	This species has been reported in a wide variety of habitat types ranging from sea level to approximately 9,000 feet above MSL. Habitat associations include coniferous forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types. Foraging associations include edge habitats along streams, adjacent to and within a variety of wooded habitats.	This species has a potential to forage within the Study Area, although roosting is unlikely to occur since cave and abandoned buildings do not occur within the Study Area. A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a as cited in the CEC RSA, 2010).
Western mastiff bat *Eumops perotis*	The subspecies that occurs in North America, *E. p. californicus*, ranges from central Mexico across the southwestern United States including parts of California, southern Nevada, Arizona, southern New Mexico and western Texas. Recent surveys have extended the previously known range to the north in both Arizona with several localities near the Utah border and California. It is found in a variety of habitats, from desert scrub to chaparral to oak woodland and into the ponderosa pine belt and high elevation meadows of mixed conifer forests. Surveys in northern Arizona have documented roosts at approximately 3,600 feet elevation and foraging bat species at 7,500 feet above MSL (WBWG, 2005-2009 as cited in the CEC RSA, 2010).	The project site does not support suitable roosting habitat for western mastiff bat but this species may utilize the Study Area for foraging. The nearest CNDDB record is approximately 5 miles southwest of the Study Area (CDFG, 2010). A single bat of an unidentified species was observed roosting beneath a bridge near Corn Springs Road near the location of the proposed substation during December 2009 surveys (AECOM, 2010a as cited in the CEC RSA, 2010).
Yuma myotis *Myotis yumanensis*	This species ranges across the western third of North America from British Columbia, Canada, to Baja California and southern Mexico. Yuma myotis is usually associated with permanent sources of water, typically rivers and streams, feeding primarily on aquatic emergent insects, but Yuma myotis also use tinajas in the arid west. It occurs in a variety of habitats including riparian, arid scrublands and deserts, and forests. The species roosts in bridges, buildings, cliff crevices, caves, mines, and trees.	This species has a potential to roost and forage within the project site. The nearest CNDDB record is from 2002 near the Blythe bridge over the Colorado River where individual bats of this species were detected acoustically during April 2002 (CNDDB, 2010 as cited in the CEC RSA, 2010).
Yuma mountain lion *Puma concolor browni*	In the NECO planning area, mountain lions primarily inhabit the low mountains and extensive wash systems in and around Chuckwalla Bench, Chuckwalla Mountains, Chocolate Mountains, Picacho Mountains, Milpitas Wash, Vinagre Wash, and other washes in that area. Mountain lions typically occur in habitat areas with extensive, well-developed riparian or shrubby vegetation interspersed with irregular terrain, rocky outcrops, and community edges. Mountain lions are restricted to the southern Colorado Desert from Joshua Tree National Park south and east to the Colorado River. Burro deer, the primary prey item, are known to spend the hot summer and fall in riparian areas along the Colorado River and in dense microphyll woodlands near the Coachella Canal.	Mountain lion likely use the Study Area, but no definitive sign for this species was observed during 2009 spring surveys.