

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area. Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Our conclusions and recommended measures are discussed in section 5.2, *Comprehensive Development and Recommended Alternative*, of this final EIS.²⁴

3.1 GENERAL DESCRIPTION OF THE PROJECT AREA

The proposed project would be located at the edge of the Eagle Mountains in southeastern California in Riverside County in the western Sonoran Desert, commonly called the “Colorado Desert,” which includes the area between the Colorado River Basin and the Coast Ranges south of the Little San Bernardino Mountains and the Mojave Desert. The proposed project would be located south and east of JTNP, just about 1.5 miles from the closest JTNP boundary (see section 3.3.5, *Recreation, Land Use, and Aesthetics*, for more about the JTNP).

Rainfall amounts are low, ranging from about 3 to 5 inches per year; however, the amount of precipitation is variable on a year-to-year basis with some years receiving almost no rainfall. Winter temperatures are mild with typical high temperatures in January in the mid-60s°F and low temperatures near 40°F. Summer temperatures are hot. Summer high temperatures are typically near or slightly above 105°F and often exceed 110°F, while low temperatures average near 80°F. The period of extremely warm weather is also lengthy, extending from mid-spring through the fall. Evaporation in the area is quite high, and for open water sources has been estimated at about 7.5 feet per year.

Gently sloping to undulating rocky slopes and valleys are found in the area of the proposed project’s linear features (i.e., water pipeline and transmission line). Elevations range from about 400 to 2,500 feet. No perennial streams or natural wetlands exist in the project vicinity. Drainages in this part of Riverside County are generally limited to high-energy runoff via desert washes that are usually dry. As water from these events quickly

²⁴ Unless otherwise indicated, our information is taken from the application for license for this project (Eagle Crest, 2009a) and additional information filed by Eagle Crest (Eagle Crest, 2010a, 2009b–d) and the State Water Board EIR (State Water Board, 2010). Section 6.0, *Literature Cited*, presents all literature cited in the preparation of this document.

percolates into the surrounding soil or evaporates, the establishment of wetland vegetation is precluded.

Drainage patterns reflect the local topography. Along the broad rocky slopes, drainage is primarily characterized by scattered, well-defined washes and networks of numerous narrow runnels. The runnels are several yards wide, sandy to cobbly drainages that carry periodic runoff to a regional drainage. They are often incised, from a half to several yards deep, and vegetated along the banks by shrubs and trees. By contrast, the more numerous, smaller and shallow runnels are typically only a yard or less wide, 1 to 3 inches deep, and irregularly vegetated by locally common shrub species.

Soils generally range from soft sand to coarse-sand loams, with Aeolian patches of loose sand and intermittent incipient dunes. Boulders and cobbles are common in the upper bajadas and toeslopes, with smaller particles downslope. Desert pavement²⁵ is intermittently present in the immediate area of the central project area.

Numerous transmission lines and service roads cross the area south of the project site. The Colorado River Aqueduct extends through the Coxcomb Mountains northeast of the project area and continues in a southwesterly direction, passing the eastern portion of the project area as an open channel before converting into a tunnel to the Metropolitan Water District's pumping plant.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing National Environmental Policy Act (40 CFR §1508.7), a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities.

Based on review of the license application and agency and public comments, we identified water resources, terrestrial resources (including federally listed threatened and endangered species), land use, recreation, and air quality as having the potential to be cumulatively affected by the proposed project in combination with other past, present, and foreseeable future activities. These resources were selected because of the potential that they could be cumulatively affected by the development of this project in addition to other residential and agricultural groundwater uses, the Colorado River Aqueduct, the proposed Eagle Mountain landfill, proposed solar energy and wind energy developments, and other actions that we identify in our analysis.

²⁵ Desert pavement, which occurs only in the drier parts of the Sonoran Desert, is a surface made up of a closely packed mosaic of stones that accumulate as the finer dust and sand particles are blown away by the wind.

3.2.1 Geographic Scope

The geographic scope of the analysis defines the physical limits or boundaries of the proposed action's effect on the resources. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary.

The geographic scope for water resources would be the Chuckwalla Valley Aquifer and potentially adjacent, hydrologically connected aquifers, such as the Pinto Basin Aquifer. This geographic scope was selected because the groundwater to be used for this project, as well as other reasonably foreseeable projects, would be withdrawn from the Chuckwalla Valley Aquifer, and we may determine that cumulative groundwater-level effects may extend to adjacent basins.

The geographic scope for terrestrial resources would be lands above the Chuckwalla Valley Aquifer and Pinto Basin Aquifer, which includes portions of JTNP. This broad area was identified to address the potential for subsidence related to groundwater withdrawal to cumulatively effect terrestrial plants and wildlife. Other project effects would also be limited to this geographic area.

The geographic scope for recreation, land use, and aesthetics is the greater Chuckwalla Valley from the Coxcomb Mountains to the east, the Chuckwalla Mountains to the south and JTNP to the north and west. This area offers the recreation opportunities, landscapes, and the visual resources, which are typical of the region, and may also be cumulatively affected by other reasonably foreseeable projects.

The geographic scope for other resources, including geological resources and soils; terrestrial and threatened and endangered species; cultural; socioeconomics; and air quality and noise, would be that portion of the Chuckwalla Valley and Interstate 10 corridor sufficient to encompass all project facilities, as well as construction and operation effects.

3.2.2 Temporal Scope

The temporal scope of the cumulative effects analysis in the final EIS includes past, present, and future actions and their respective effects on each resource that could be cumulatively affected. Based on the potential term of an original license, the temporal scope will look 50 years into the future, concentrating on the effect on the resources from existing and reasonably foreseeable future actions. The historical discussion will be limited, by necessity, to the amount of available information for each resource. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effect of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the

existing condition and baseline against which we measure effects. We then discuss and analyze the specific site-specific and cumulative environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EIS. We present recommendations in section 5.2, *Comprehensive Development and Recommended Alternative*.

3.3.1 Geologic and Soil Resources

3.3.1.1 Affected Environment

General Geologic Setting

The proposed project site is located in the northeastern portion of the Eagle Mountains near the lower western edge of the Mojave Desert Physiographic Province of California, slightly east of the southern limits of the adjacent Transverse Ranges Physiographic Province. The Eagle Mountains are bounded on the northeast by the Coxcomb Mountains, the southeast by Chuckwalla Valley, and the north by Pinto Basin (figure 5). To the south are the Orocopia Mountains (west) and the Chuckwalla Mountains (east). A broad valley containing Smoketree Wash forms the edge of the Eagle Mountains to the west. The Cottonwood Mountains are to the southwest of the project area.

The major rock units in the region include Jurassic- to Cretaceous-age plutonic intrusive rocks and Paleozoic and Precambrian metamorphic and meta-sedimentary rocks (Jennings, 1967). At the Eagle Mountain site, the meta-sedimentary rocks generally trend northwest and are surrounded and underlain by intrusive granitic rocks. The meta-sedimentary rock units have been folded into a northwest-trending anticline, which continues into the north-central Eagle Mountains. Iron ore deposits composed of magnetite and hematite are typically found along the northeast limb of this anticline.

Localized outcrops of Tertiary-age volcanic rocks are found in the region, principally at the northern end of the Chuckwalla Valley. Younger Pleistocene-age basalt is present in the north-central portion of the Eagle Mountains. Deposits of Quaternary-age alluvium fill the Pinto Basin and Chuckwalla Valley, locally reaching depths of greater than 2,000 feet (Eagle Crest, 1994). Alluvial deposits include both cobbles/gravels and finer grained units that form alluvial fans at the mouths of major drainages from the adjacent highlands.

Regional structural trends are reflected in the alignments of faults in and near the Eagle Mountain site. East-west trending faults are present at distances of about 5 miles, both to the north and south of the site, while northwest-trending faults are present locally along the eastern edge of the Eagle Mountains. The latter group of faults includes the Bald Eagle Canyon fault zone and several smaller faults that traverse the planned tunnel alignments. None of these faults have experienced deformation within the last 11,000 years as indicated by the unbroken alluvial deposits that overlie them (Eagle Crest, 1994).

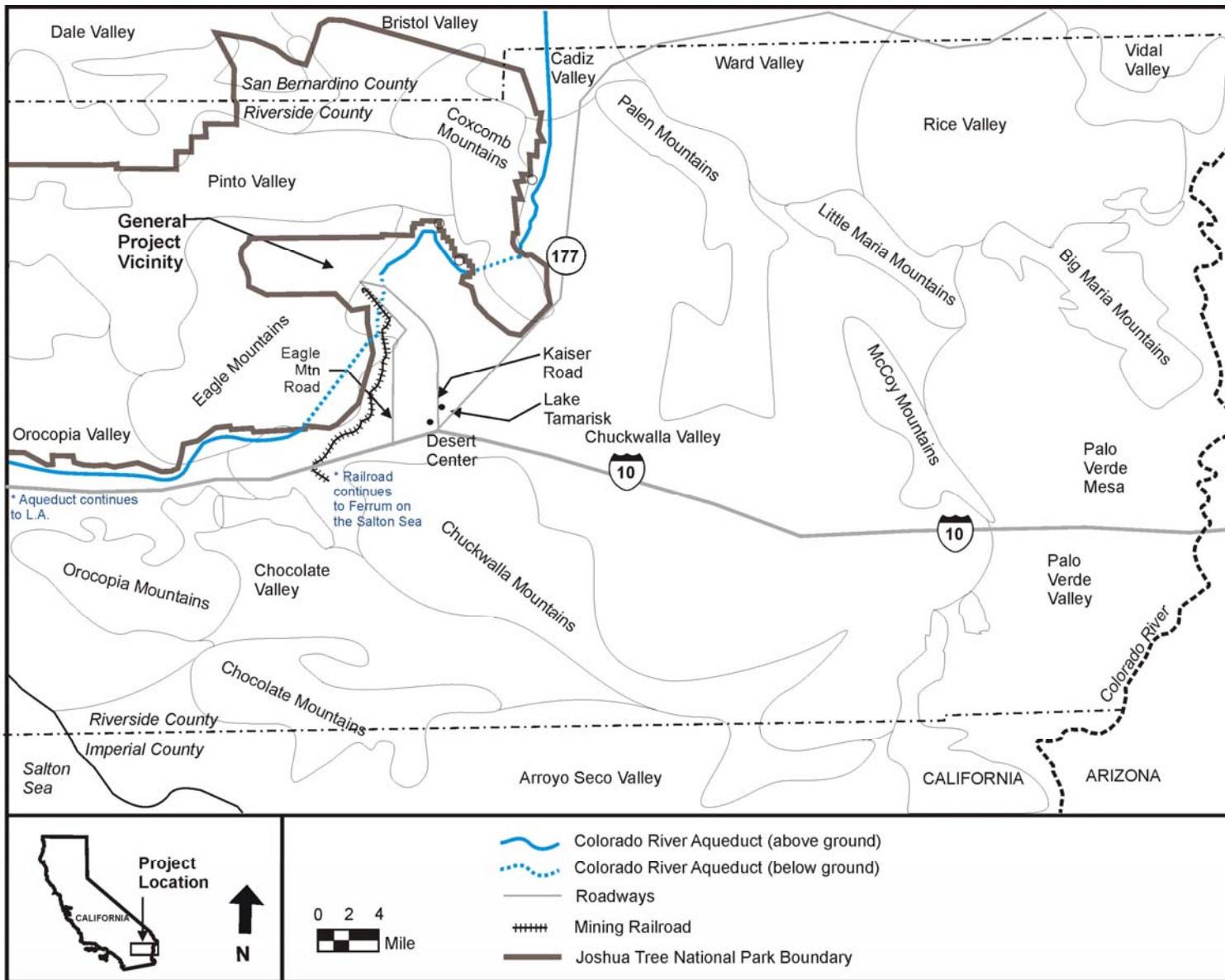


Figure 5. Mountains and groundwater basins in the project area (Source: Eagle Crest, 2009a, as modified by staff).

The proposed project site is cut by a series of northeast-trending dikes.²⁶ The dikes have near-vertical dips and lie at nearly right angles to the northwest-trending faults. Where exposed, dikes that cross the northwest-trending faults are not offset by the faults (Eagle Crest, 1994).

Range-front faulting has been recognized to the east of the Eagle Mountain site, along the eastern side of the Chuckwalla Valley parallel to the base of the Coxcomb Mountains. Vertical displacements along this fault zone may be up to several thousand feet, with the western side being displaced downward relative to the eastern side (Eagle Crest, 1994). Range-front faults do not appear to be present along the eastern side of the Eagle Mountains.

Project Area Geology

Bedrock geologic units present at the site can be generally classified as either igneous or meta-sedimentary. In general, the younger igneous rocks intruded into the older meta-sedimentary rocks, leaving the meta-sediments as remnant roof pendants atop the plutonic rock. Areal near-surface exposures of the rock units in the project area are shown on figure 6.

Unconsolidated alluvial deposits are found in several locations within the project site area (figure 6). The alluvial deposits include sands, silts, gravels, and debris-flow deposits (Eagle Crest, 1994). The most substantial alluvial deposits are found on the eastern edge of the site area, where they form a laterally extensive alluvial fan that extends and thickens to the east into the Chuckwalla Valley. The thickness of the alluvial fan is on the order of a few tens of feet near the mountain front and thickens steadily to the east.

Some of these alluvial deposits are exposed in the east wall of the eastern mining pit, in an area that would underlie the lower reservoir (Eagle Crest, 1994). Elsewhere within the area of the proposed project, alluvial deposits are confined to laterally discontinuous, generally thin deposits along the bottoms of the canyons (Eagle Crest, 1994). These deposits are typically composed of sandy gravel, but may vary locally from sand and gravelly sand to gravel and generally range up to 50 feet in thickness. The thickest deposits are found near the mouths of canyons. Older alluvial deposits in the upper portions of the canyons may be locally cemented (Eagle Crest, 1994). An alluvial fan is exposed near the base of the north wall in the eastern mining pit of the largely inactive Eagle Mountain mine (Eagle Crest, 1994). At the base of this feature, and interbedded with some of the soils characteristic of the upper portions of the fan, are a series of debris flows. In the east wall of the eastern mining pit, debris flow deposits rest directly on bedrock (Eagle Crest, 1994).

²⁶ A dike is an intrusive igneous body that normally has a thickness much smaller than its other two dimensions.

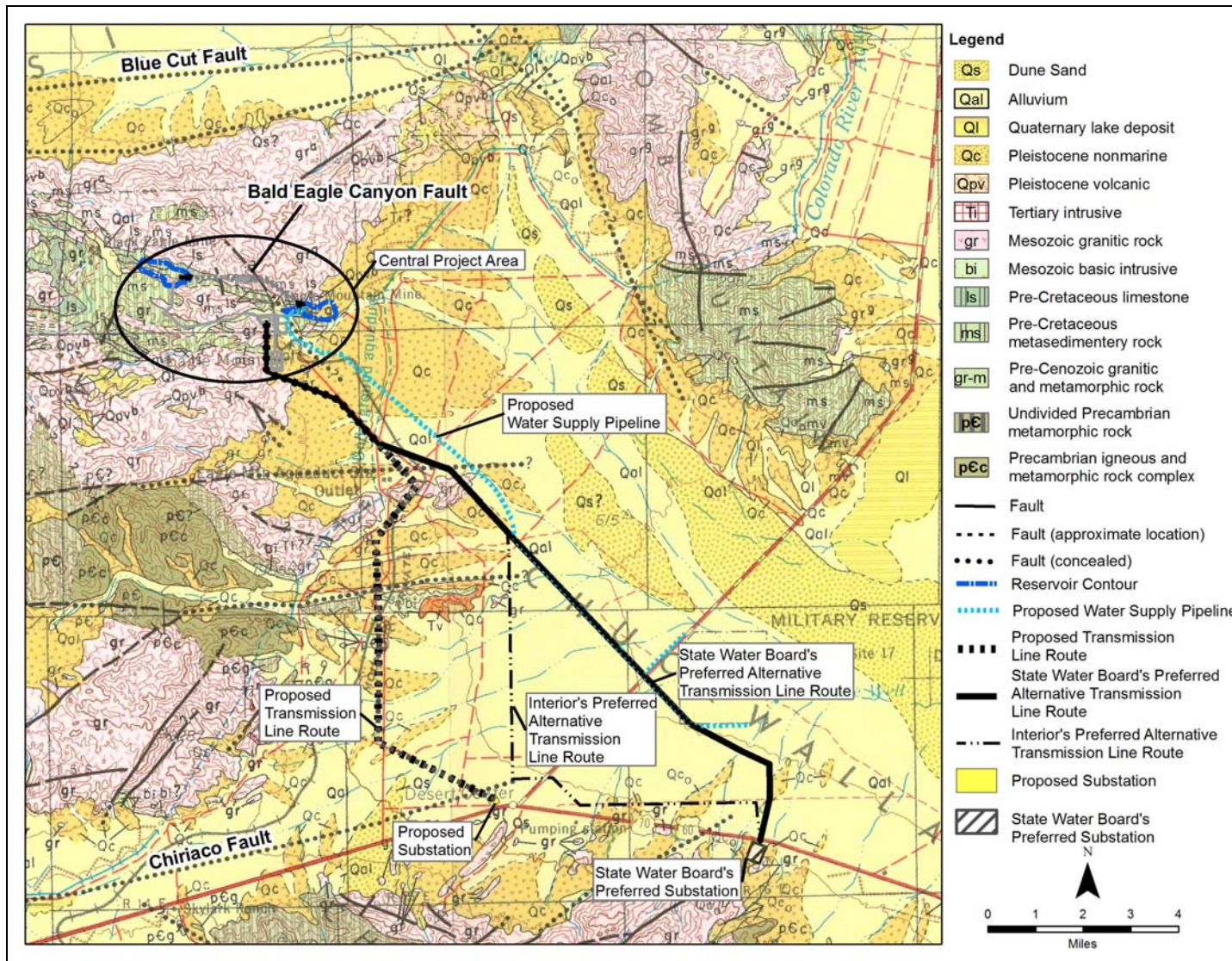


Figure 6. Eagle Mountain Project area geologic map (Source: Eagle Crest, 2009a, as modified by staff).

Mining byproducts generated by the former Eagle Mountain operations were deposited in numerous areas near the site. These byproducts include several distinctly different materials, including both bedrock and alluvial overburden, and tailings produced as a result of the mining and separation of iron ore bearing rock from host rock. The tailings include both fine and coarse varieties. The total amount of recoverable (i.e., not in-ground) iron ore reserves at Eagle Mountain mine has been estimated at 170 million tons, with about 23.5 million tons of this total amount (14 percent) reported to remain at the east end of the eastern mining pit (i.e., the proposed lower reservoir) (GeoSyntec, 1992, as cited in Eagle Crest, 1994). The 23.5 million tons of iron ore reserves are specifically situated within the 467-acre parcel of land that is currently held by the California State Lands Commission.

In its preliminary report, the U.S. Geological Survey (USGS) estimated that the total amount of iron ore possibly remaining in the underlying bedrock, or “in-ground” (i.e., not in the coarse tailings present in the pits or stockpiled elsewhere onsite), is up to 600 million tons and generally found within quartz monzonite-rich bedrock (Force, 2001), which is a sub-unit of the Mesozoic granitic rock unit that composes much of the Eagle Mountains (see figure 6).

There are conflicting reports about the occurrence of recoverable precious metals (e.g., gold, silver, or any of the minerals of the platinum group) in the proposed project area. Investigations in 1990 (Kaiser Steel Resources, Inc., 1990, as cited in CH2M HILL, 1996) indicated that recoverable precious metals are not present in the project area. In contradiction to this finding, on February 28, 2001, Kaiser filed with the Commission, as part of its comments on the draft EIS, a document titled *Conceptual Study of Kaiser Ventures Inc.’s Eagle Mountain Project for Recovery of Contained Mineral Values* and dated 2000. This document states that there is “sufficient mineral grades and tonnage of gold, platinum, palladium, and iron” that “may exist in the process tailing to warrant a stand-alone 5,000 ton per day tailings recovery operation” (Behre Dolbear, 2000).

Eagle Crest states that the tailings would be suitable for use in project construction. Historical information on mining activity at the Eagle Mountain mine is presented in section 3.3.6.1, *Cultural Resources, Affected Environment*.

Soil Resources

General Project Area

The soils within the proposed project area are generally sandy and have developed in a mid-latitude, low desert environment at elevations ranging from 1,000 to 2,800 feet above mean sea level (msl). Slopes range from nearly level to extremely steep and include both north- and south-facing exposures as well as numerous intermediate aspects. Vegetation is Sonoran desert shrubland (Eagle Crest, 1994). Soils within the proposed project area can be divided into the following mapping units.

In areas of 2 to 5 percent slope, soils are very deep, excessively drained, sand and loamy sand horizons formed in alluvial fan deposits at the eastern foot and within valley bottoms of the Eagle Mountains. The water erosion hazard of these soils is moderate because of minimal vegetative protection. The less-steep soil unit is situated near the east side of the eastern mining pit and beneath the proposed lower reservoir spillway, while the slightly steeper soil unit is situated in part beneath the proposed desalination and staging, storage, and administration areas.

In areas of slopes greater than 15 to 75 percent, there are rock outcrops; shallow, excessively drained, very gravelly sand; and very gravelly loamy sand. These soils have formed on mountain slopes in colluvial deposits derived from crystalline bedrock. The water erosion hazard of these soils is severe because of steep slopes and minimal vegetative protection. This soil unit is found in various locations around the project area, including between the central and eastern mining pits and near the desalinization area.

Soils in areas of mine dumps and tailings consist of mixed cobbles and soil deposited by human activity. These deposits have not been stable long enough to develop characteristic soil profiles. This unit is found throughout the project area, particularly in areas immediately adjacent to the central and eastern mining pits.

The excavations of the central and eastern mining pits are characterized by disturbed rock outcrops or a thin mantle of mixed soil and cobbles deposited by human activities.

Desert pavement²⁷ is known to be intermittently present in the central project area, as mapped as part of a geomorphic and soil-stratigraphic age assessment study conducted in support of the proposed landfill project (Shlemon, 1993).

Water Supply and Transmission Line Corridors

Specific areas of the water supply and transmission line corridors have not been mapped in detail according to the applicant, although limited soils mapping was performed by Kim (1993) in the Desert Center area, which is in the vicinity of the proposed linear feature corridors. The proposed water supply corridor extends through a desert basin environment crossed by numerous washes. The soils of this area are gravelly loamy sands with particle size decreasing with distance from the mountains. The soils have low runoff, with moderately rapid to rapid permeability.

Soils, slopes, and vegetation coverage within the proposed transmission line route and the BLM utility corridor area are similar to those along the proposed water supply

²⁷ Desert pavement, or armoring, is a natural concentration of wind-polished, closely packed rock fragments that mantle a desert surface and often protect the underlying finer-grained materials from further erosion.

corridor. Specifically, soils within the transmission line corridor have developed primarily on valley fill alluvium. The soils are excessively drained fine sands, sands, gravelly sands, and cobbly sands. In some areas, the soils are deep (5 to 6 feet deep) with a moderate water erosion hazard, are found on nearly level to moderately steep slopes, and have formed on alluvial fans and valley fill. In other areas, the soils are shallow, are found on nearly level to steep slopes, have formed on hill and mountainsides, and are subject to severe water erosion on steeper slopes.

The Chuckwalla Valley experiences active wind-blown, or aeolian, sand migration and deposition that contribute to the formation of sand dunes on the valley floor. The general direction of the aeolian-driven sand migration is to the southeast and east, toward the Colorado River. The sand migration corridor situated within the upper Chuckwalla Valley has been designated as the “Palen Dry Lake–Chuckwalla” corridor, which runs past the central project area and to the north of Desert Center toward Palen Dry Lake (PWA, 2010).

Geologic Hazards

Potential geologic hazards at the proposed project area include ground rupture from active faulting, strong ground motions from earthquakes, landslides or rockfalls (induced by earthquake, rainfall and saturation, or other triggers), and liquefaction and seismic settlement.

Seismicity

There are numerous active²⁸ and potentially active²⁹ faults and fault zones located within 100 miles of the proposed project area (Eagle Crest, 1994; GeoSyntec, 1996). Based on the Fault Activity Map of California, the nearest active faults to the site are the Hot Springs fault and the paralleling San Andreas fault (Coachella segment), located about 30 miles and 33 miles southwest of the site, respectively.

The Alquist-Priolo Earthquake Zoning Act (Bryant and Hart, 2007) establishes zones around “sufficiently active and well-defined” faults in California wherein site-specific fault location studies are required to mitigate fault surface rupture hazards prior to construction intended for human occupancy. The closest “zoned” faults to the project

²⁸ Active faults (Bryant and Hart, 2007) are defined as faults along which seismically induced (tectonic) displacement has occurred in the past 11,000 years (the Holocene epoch). The California Division of Safety of Dams criterion for active faults (Fraser, 2001) is noted displacement within the last 35,000 years.

²⁹ Potentially active faults are defined as faults along which tectonic displacement has occurred between 11,000 and 1.6 million years before present (the Pleistocene epoch). Inactive faults are defined as faults along which tectonic displacement has not occurred in the past 1.6 million years (i.e., before the Quaternary period).

area are the Hidden Springs fault, located 29 miles to the southwest, the aforementioned Hot Springs fault, and the mid-east portion of the Pinto Mountain fault, located 32.5 miles to the northwest.

Potentially active faults are also frequently considered in a seismic hazard assessment since they can represent active faults that have a greater (more than 11,000 years) recurrence interval. In addition to the aforementioned faults, potentially active late Quaternary faults considered capable of generating significant seismic events include the Blue Cut fault, with the nearest segment mapped about 4 miles north of the site; the Salton Creek fault, about 23.5 miles to the southwest; and eastern segments of the Pinto Mountain fault, located 30.5 miles northwest of the site. In addition to these fault-specific sources, previous investigations of seismic exposure at the project area (Eagle Crest, 1994; GeoSyntec, 1996) considered non-specific area sources including the Southeast Transverse Ranges, the San Bernardino Mountains, the Eastern Mojave, the Sonoran, and the Salton seismo-tectonic zones.

Locally, six major structural lineaments have been found to trend across the proposed reservoir sites or are within 2,000 feet of the proposed project area (GeoSyntec, 1992, as cited in Eagle Crest, 1994). Three of these are bedrock faults (Fault A, Bald Eagle Canyon fault, and eastern mining pit fault), two are intrusive dikes, and the last formed from differential erosion along prominent joints in the bedrock (see figure 6). Field investigations indicated that the lineaments trend northwest across the site in a direction consistent with a pattern of regional faulting believed to have existed since Miocene time (i.e., about 5 to 22 million years ago [Ma]) (Proctor, 1993, as cited in Eagle Crest, 1994; Shlemon, 1993). Analyses performed as part of these investigations indicated that no displacement has occurred along these local faults in the past 40,000 to 100,000 years (GeoSyntec, 1996). Site mapping indicated that cross-cutting dikes of volcanic rock, dated as 124 million years or more in age (GeoSyntec, 1996), are not offset by Fault A and the Bald Eagle Canyon fault. This suggests that the most recent movement of these faults dates back to at least Mesozoic time (≥ 65 Ma). The relationship of the cross-cutting dikes to the eastern mining pit fault is less certain, but the fault is readily exposed in the walls of the eastern mining pit beneath up to 270 feet of unbroken alluvium, estimated to be more than 100,000 years in age (Proctor, 1993, as cited in Eagle Crest, 1994).

Additional northwest-southeast fault segments were mapped; one in the western end of the eastern mining pit and another at western end of the proposed landfill footprint (GeoSyntec, 1996). Soil stratigraphic age dating of these features was hindered by lack of natural soil cover. However, GeoSyntec (1996,) concluded that, due to the echelon structure of the northwest-southeast system of site area faults, formation of all the northwest-trending faults at the site occurred within a similar geologic age and tectonic stress regime. Thus, these additional fault segments were also concluded to be at least pre-Holocene in age ($< 10,000$ years). However, if the northwest-trending faults are collectively considered to be of similar age and origin, significant displacement has not occurred on these faults since the formation of the dikes more than 100 million years ago.

As such, these faults are considered inactive. Further details of the investigations for onsite faults, including information from the Proctor (1993, as cited in Eagle Crest, 1994) and Shlemon (1993) studies, are contained in GeoSyntec (1996).

The project site lies on the eastern edge of a region of high historical seismicity in southern California. Most seismicity in this area is associated with the San Andreas fault zone (southwest and west of the site), the San Jacinto fault zone (south and west of the site), or the Brawley fault zone (south of the site). Some seismicity is associated with the Pinto Mountain fault to the north of the site. The California Geology Survey (California GS) provides a database of all known historical earthquakes of magnitude greater than 4.0 within the project region for the period from 1769 to 2000 (California GS, 2001). Since 2000, no seismic events of a magnitude greater than 4.0³⁰ have occurred near the project area, and no previously unmapped faults have been identified in the vicinity, based upon review of the Southern California Earthquake Data Center (SCEDC) online database, which contains data between 1932 to present (SCEDC, 2011). According to the SCEDC database, numerous seismic events have been recorded in the central project area. These events, which had magnitudes up to about 3.0, were caused by mining-related blasting (termed “quarry blasts” in the online database).

Upon review of recorded seismicity in the region, and using the attenuation relationship developed by Sadigh as reported by Joyner and Boore (1988), GeoSyntec (1992, as cited in Eagle Crest, 1994) estimated that the strongest ground motion at the site from historical events was about 0.15 g,³¹ using mean attenuation rates, and 0.27 g using mean plus one standard deviation.

Calculations of potential ground motion at the project site during an earthquake estimated the highest horizontal peak ground acceleration (PGA)³² of 0.49 g that results from a magnitude 6.75 random event in the Southeast Transverse Ranges. A similar PGA of 0.48 g was estimated from a magnitude 7.5 event on the Blue Cut fault (Eagle Crest, 1994; GeoSyntec, 1996). Regional probabilistic studies on seismicity (Petersen et al., 2008) estimate that the site has a 2 percent probability of exceeding PGAs of between 0.35 and 0.46 g in the next 50 years. Analysis of probabilistic potential ground motions for the project area, based on USGS (Frankel et al., 2002) and California GS (2007) databases, indicates that, for return periods of 100 and 475 years, PGAs of 0.10 g and 0.19 g, respectively, are estimated.

³⁰ With a seismic event of a magnitude below 4.0, structural damage is unlikely.

³¹ 1 g is the acceleration due to gravity, where 1 g = 32.2 feet second⁻²; used to measure the peak ground acceleration during an earthquake.

³² PGA is a parameter used to measure the horizontal force experienced at a given location during an earthquake. This force has the potential to cause damage to structures depending on its magnitude and on how much horizontal force the structure can physically withstand.

Liquefaction

Liquefaction can occur when loose, saturated granular soils are subjected to strong ground motion, such as that induced by earthquakes. The ground vibrations cause a rise in pore-water pressure,³³ which, if high enough, can cause the soil to lose strength and behave as a fluid. Liquefaction can result in settlements, lateral spreading, and other disruptions at the ground surface. The sandy sediments associated with the alluvial fan and valley floor features in the project area could have the potential for liquefaction and seismic settling. Groundwater conditions, which can affect the potential for liquefaction occurrence during an earthquake, are discussed in the *Groundwater* section.

Landslides and Mass Movements

In the proposed project area, there are potentially unstable slopes upon hillsides and mining pit walls due to their steepness and the nature of the underlying soil and rock types. Mass movements such as slope raveling and localized surficial slope failures and/or rock falls could occur here.

To date, USGS and California GS have not published any soil-slip susceptibility or landslide inventor maps of the project region; therefore, detailed mapping information is not available for evaluating the potential for landslide and mass movement activity in the proposed project area.

3.3.1.2 Environmental Effects

This section describes the potential project effects related to geology and soils resource issues deriving from construction and/or project operation activities. Prior to construction, the applicant proposes to conduct detailed subsurface investigations in the project area to support final project configuration and design. The details of these proposed site investigations are summarized by the applicant in section 12.6 of its license application (Eagle Crest, 2009a). In brief, these investigations would primarily involve soil/rock exploration boring³⁴ and detailed geologic mapping efforts to further evaluate potential project-related reservoir seepage, hydrocompaction and subsidence, landslides and mass movements, liquefaction, and reservoir-triggered seismicity. The investigations would additionally consider the effects of project construction-related blasting and boring on existing geologic conditions; blasting and boring would be used to construct the underground tunnels, surge control facilities, and powerhouse. In its letter filed October 27, 2009, Eagle Crest states that the subsurface investigations would be initiated within

³³ Pore-water pressure is the force exerted by groundwater contained within the voids, or pores, of a soil or rock substrate. Excessive pore-water pressures can lead to soil or rock instabilities.

³⁴ The soil/rock borings would be drilled every 1,800 feet along the alignment of the proposed tunnel.

60 days of licensing and receipt of site access, field work would be completed within 4 months of the start of field investigations, and the results would be filed with the Commission 6 months after the start of the field investigations.

Effects of Project Construction and Operation Related to Seismic Issues

Earthquakes and Faults

There are no active faults in the proposed project area, based on the findings of past site-specific investigations (GeoSyntec, 1996). Therefore, the risk of surface rupture at the project area caused by local faulting is considered to be very low as these faults were determined to be inactive within the past 40,000 years or more. The project facilities would be designed to resist the anticipated ground shaking related to earthquake activity in the region. As mentioned above, prior to construction, Eagle Crest proposes to conduct subsurface investigations, which would also include a geotechnical study in order to modify, if needed, the existing project designs.

Reservoir-Triggered Seismicity

The proposed project would include constructing upper and lower reservoirs, which would occupy areas that are crossed by several inactive, northwest-trending faults. In general, reservoir impoundment or operation has the potential to activate fault movement, and hence produce earthquakes, which is a process defined as reservoir-triggered seismicity. This process occurs when reservoir impoundment alters the stress regime within the crust of the earth by increasing shear stress due to the weight of water, and reducing the shear strength (i.e., resisting force) by increasing pore-water pressures. While these changes are generally insufficient to generate failure in unfractured rock, it is possible that faulted rock under significant tectonic strain may be induced to slip by the compounding effects of reservoir impoundment (USCOLD, 1997). As such, zones of active faulting appear to be the most susceptible to reservoir-triggered seismicity. Further, the maximum credible earthquake for an area is not considered to change by reservoir filling actions, although the frequency of smaller earthquakes may be increased, at least on a temporary basis (FEMA, 2005).

To assess the actual occurrence of reservoir-triggered seismicity in the project area once implemented, Eagle Crest proposes to initiate a seismic monitoring program in the project area. Eagle Crest proposes to maintain the monitoring program before and after reservoir filling to assess whether these actions lead to reservoir-triggered seismicity.

Our Analysis

The proposed project area is crossed by several inactive faults and would be situated in a region with recorded seismic activity. The two proposed reservoirs would use the two largely inactive mining pits that were created by the excavation of vast

quantities of overburden and ore-bearing rock. When either the upper or lower reservoirs are filled to maximum operation level, the deepest column of water in each would be less than the depth of mining excavation. Total water storage projected for both reservoirs is estimated at about 24,200 acre-feet compared to a total storage capacity of 41,900 acre-feet.³⁵ Considering that the weight of water is about 2 (overburden) to 2.5 (ore rock) times less than that of the excavated material, the loads applied by the reservoirs at high water would be substantially less than that originally imposed prior to mining. As such, Eagle Crest reasonably asserts that the reservoir load may tend to restore some of the equilibrium lost through the site excavations rather than imposing potentially destabilizing stresses that could lead to earthquakes.

Although the maximum depth of stored water in the reservoirs would characterize both reservoirs as being “shallow and small”³⁶ (Baecher and Keeney, 1982), the initial filling of the reservoirs and the planned twice-daily movement of a relatively large mass of water could impose stress upon the underlying land surface. This stress could potentially trigger land movement, manifested either slowly via gradual earth movement or rapidly as a small earthquake. Several fault traces crossing beneath or close to the two proposed reservoirs could serve as the focus of these movements, despite the findings that these inactive faults have not experienced natural seismic activity within the past 40,000 years.

Based on the potential for naturally caused and reservoir-induced earth movements to occur in the project area during the operation of the proposed project, we see the benefits associated with Eagle Crest’s proposal to: (1) conduct a thorough subsurface investigation in the project area to better characterize existing conditions for the purpose of refining the final design of project features (i.e., implementation of a Geotechnical Study Plan as proposed in section 12.6 of Eagle Crest’s final license application [Eagle Crest, 2009a]), and (2) establish a seismic monitoring program per the general recommendations of the International Commission on Large Dams (ICOLD, 2008) for reservoir projects. Continuing the applicant’s proposed seismic monitoring program through the initial operation and life of the project would help determine if there is the potential of reservoir-triggered seismicity within the area.

³⁵ For generation at a pumped storage facility to occur, water storage at both reservoirs is normally slightly more than half of the total available storage.

³⁶ “Shallow and small” reservoirs are considered by Baecher and Keeney (1982) to have a probability of reservoir-triggered seismicity that is “very near zero” and are defined as reservoirs having less than 302 feet of water depth and storing less than about 973,000 acre-feet of water volume.

Effects of Project Construction and Operation on Liquefaction

The proposed pumped storage reservoirs and associated facilities would be constructed on a combination of bedrock and alluvium. As discussed in greater detail in the *Groundwater* section, groundwater levels in the project area are typically hundreds of feet below the ground surface, although in the eastern mining pit, the most recent available groundwater data (CH2M HILL, 1996) indicate a groundwater level that at times is about 20 feet below the lowest portions of the pit.

Liquefaction can occur when loose, saturated sandy soils are subjected to earthquakes. In its license application, Eagle Crest provides the screening criteria from the Southern California Earthquake Center for determination of liquefaction hazards (SCEC, 1999) and concludes that a liquefaction assessment is not required. The criteria are as follows:

1. the estimated maximum past, current, and future groundwater levels are determined to be deeper than 50 feet below the existing or proposed final site grade;
2. bedrock or other similar material that is considered to be non-liquefiable directly underlies the site;
3. the granular (i.e., sandy) soils underlying the site are all determined to be dense to very dense; and
4. the underlying soils have a clay content greater than 15 percent.

Eagle Crest further states that geologically mature alluvial fan and plain sediments, like those found on the eastern edge of the eastern mining pit, generally have a low potential for liquefaction based on their relatively high material density (Youd and Perkins, 1978).

To minimize the potential for a liquefaction hazard to occur, Eagle Crest proposes to maintain pre-project groundwater levels in areas influenced by reservoir seepage by installing a seepage recovery system as described in section 3.3.2, *Water Resources*, under the heading *Groundwater*. Eagle Crest indicates that the potential for liquefaction-induced settlements would be very low to non-existent because, coupled with implementation of the recovery system, the project would mostly lie on shallow bedrock, dense geologically mature sediments, or properly engineered and compacted fill.

Our Analysis

The project would include two reservoirs and associated facilities mostly built on bedrock with some portions of these structures (e.g., east side of the lower reservoir) built on alluvial sediments. Following the SCEC (1999) screening criteria, the proposed project fails to satisfy the first three of the four criteria, specifically for those project areas

near the east side of the eastern mining pit. Groundwater levels beneath the proposed lower reservoir are reportedly within 50 feet of the existing ground surface, or bottom of the eastern mining pit. Further, the soil densities and the clay content levels in sediments underlying portions of the project area are not wholly known. Therefore, a liquefaction assessment in the project area and in areas where project-induced groundwater levels could rise within 50 feet of the surface (e.g., from reservoir seepage) would provide needed information to address liquefaction concerns. Collecting data as part of Eagle Crest's subsurface investigations would allow Eagle Crest to perform the liquefaction assessment.

Effects of Project Operation on Subsidence and Hydrocompaction

Subsidence of the ground involves the downward settling of the land surface and can occur over variable rates, time periods, and spatial area. Common triggers for subsidence may be natural or human-made. In alluvial soils, like those found in the Upper Chuckwalla Valley, subsidence can occur from substantial lowering of the water level in an aquifer.

Hydrocompaction is a process whereby oversaturation of the subsurface sediments by rising groundwater levels cause sediments to consolidate and settle, thereby leading to the subsidence of the land surface. This process can be triggered by the rising of the water table in alluvial sediments.

Because these processes primarily involve an alteration of groundwater levels, discussions of the effects of the project on subsidence and hydrocompaction in the project area and the Chuckwalla Valley groundwater basin are found in the *Groundwater* section.

Effects of Project Construction on Soils

Infrequent, short-duration, high-intensity rainfall events can mobilize large amounts of loose soil and sediment in the project area. Disturbed soils and mine tailings within the largely inactive mine area, as well as other disturbed surfaces such as dirt roads, supply the source material during runoff events, resulting in surface and channel erosion, material transport, and high turbidity in receiving waters. There would be some increases in soil erosion resulting from construction of the project, specifically related to development of the upper and lower reservoirs, access roads, power line towers, water supply pipeline, and surface facilities. Project-related effects on stream channel scour potential are addressed in section 3.3.2, *Water Resources*.

Eagle Crest prepared an Erosion and Sediment Control Plan as part of its application (Measure GEO-1). The plan includes best management practices (BMPs) to be implemented during the construction process to control and minimize erosion and to stabilize disturbed lands after construction. The Erosion and Sediment Control Plan conceptually describes the erosion and sediment control practices planned for

implementation during construction of the proposed project. These measures would minimize the erosion of soils in construction areas and prevent the transport of sediment and storm water discharges from the construction site. The Erosion and Sediment Control Plan also includes the development of a storm water pollution and prevention plan prior to construction. The storm water pollution and prevention plan would include a monitoring and inspection plan with reporting to occur on a routine (unspecified) basis and after substantial storm events. Eagle Mountain also proposes to revegetate all areas disturbed by construction, including areas disturbed by the water pipeline and transmission line, with native plants.

The following BMPs are included in Eagle Crest's Erosion and Sediment Control Plan, which would be implemented during construction to prevent or minimize erosion: (1) preserve existing vegetation where required and when feasible and initiate construction immediately following vegetation clearing to minimize the exposure of scarified soil to wind and water; (2) use temporary fencing, protective barriers, or other similar methods to protect vegetation not required, or authorized to be removed; (3) slope roadways and excavations away from washes and clear loose soils and pre-existing sediments in areas where haul roads would cross surface washes; (4) install riprap at the washes; (5) build small earthen embankments within washes to slow or divert surface water; (6) install silt fences in work areas near a wash to prevent sediment from entering the wash during rain storms; (7) apply water to disturbed soil areas of the project site, under the supervision of a monitor, to ensure excessive runoff does not occur and to control wind erosion and dust; and (8) implement complementary sediment controls to intercept and filter out soil particles mobilized by surface runoff. Prior to construction, Eagle Crest would prepare a storm water pollution prevention plan detailing the BMPs that would be implemented at the site, which are subject to updating as dictated by changes in construction and construction schedules. A monitoring plan would be prepared as part of the stormwater pollution prevention plan, detailing the inspection, documentation, and corrective action procedures for the BMPs.

The proposed project's transmission lines and water supply pipeline would be installed in the upper Chuckwalla Valley and adjacent to the valley's sand transport corridor. This placement could potentially disrupt the aeolian-driven sand transport system and, in turn, dune formation and maintenance within the valley.

Our Analysis

Although the proposed project site is highly disturbed, with massive quantities of mining substrate currently exposed to erosive processes, construction of the upper and lower reservoirs, access roads, power line towers, water supply pipeline, and other constructed facilities have the potential to further disturb these materials throughout the area. Increased amounts of disturbance would increase sediment mobilized during rain events, resulting in an elevated sediment load in runoff leaving the project site and, ultimately, causing high turbidity and long-term sediment deposition in low gradient

areas. Disturbance of desert pavement, where present, could potentially occur, thereby inducing soil erosion of the underlying finer-grained materials.

Eagle Crest's Erosion and Sediment Control Plan, including BMP implementation and preparation of a storm water pollution and prevention plan and a monitoring plan, would address this potential project-related effect by adhering to industry standards. The measures outlined in the plan would minimize the potential of soil erosion of disturbed surfaces and of sediment transport in and near the construction areas.

The proposed project's transmission lines and water supply pipelines in the upper Chuckwalla Valley would be situated to the west of the sand transport corridor. Because water supply pipelines would be installed underground and transmission lines would be suspended far above ground between towers spaced adequately far apart, minimal effects on the overall aeolian system that involves the wind-driven transport of predominantly sand-sized particles and maintains active sand dunes on the valley floor would be expected.

Effects of Project Construction and Operation on Landslides and Mass Movements

Some areas within the central and eastern mining pits have potentially unstable slopes because mining has exposed unstable fractures on the pit walls. Consequently, slope failures and/or rock falls could be expected in these slopes during project construction and operations.

Eagle Crest proposes to conduct detailed subsurface investigations to support final engineering designs and to further assess potential effects on geology and soils resources. During these site investigations, which would occur after site access is granted, Eagle Crest proposes to conduct geologic mapping to identify conditions of the overburden and bedrock exposed in the mine pits that may affect the stability of slopes during reservoir-level fluctuations. Mapping would identify the degree and orientation of jointing and fracturing, faulting, and weathering, and the dimensions of the benches excavated during past mining activities. The stability of the cut slopes and benches would also be assessed at this time.

During construction activities, Eagle Crest proposes to remove loose and unstable rock blocks from slopes lying below an elevation of 5 feet above the proposed maximum water level in the reservoirs. Eagle Crest does not propose to modify existing cut slopes above these unless there is evidence of potential slope failure that could potentially affect project facilities. Eagle Crest also proposes to minimize slope failure potential by buttressing the lowermost slopes of each reservoir using mine tailings removed from potentially unstable areas above the reservoir water surface. Eagle Crest states that no mass soil or rock movements related to site construction in the central project area could occur that would affect off-site facilities existing and/or constructed upon the floor of the

Chuckwalla Valley (e.g., the Colorado River Aqueduct, Kaiser's water pipeline[s], and the Eagle Mountain town site).

Our Analysis

Construction-related activities and on-going project operations have the potential to trigger slope failures and/or rock falls on unstable slopes within and possibly adjacent to the proposed reservoirs, facilities, and along linear features (e.g., roads) where construction involves earth moving. Eagle Crest's proposed subsurface investigations would evaluate slope stability prior to the development of final engineering and designs, and its proposed measures to remove or grade the identified unstable slopes in the reservoirs would minimize slope failure potential. The investigations would additionally consider the potential effects of project-related blasting and borings on slope stability

Effects of Project Construction and Operation on Active and Largely Inactive Mines

The proposed project would use two of the four main mining pits at the largely inactive Eagle Mountain mine: the eastern mining pit and the central mining pit. The two western-most of the four main pits, the north and south Black Eagle pits, are outside the proposed central project area and would not be affected by construction and operation of the proposed facility, access roads, or transmission line. Located adjacent to the central project area, but outside of the proposed reservoir areas, are two mine adits³⁷ (Eagle Crest, 1994). Eagle Crest does not plan to use or otherwise disturb these features as part of the proposed construction. The adits appeared to be stable at the time of previous evaluations conducted more than 15 years ago (Eagle Crest, 1994), although natural minor collapses are possible in the future.

The California State Lands Commission holds a 100 percent reserved mineral interest in a 467-acre parcel of land in the Eagle Mountain mine area, situated near the east end of the eastern mining pit (proposed lower reservoir). GeoSyntec (1992, as cited in Eagle Crest, 1994) estimated that 23.5 million tons of iron-bearing placer (alluvium) deposits remain at the east end of the eastern mining pit. This amount is about 14 percent of the about 170 million tons of recoverable (i.e., not in-ground) iron ore reserves estimated to be remaining on the entire Eagle Mountain mine (Eagle Crest, 1994; Mine Reclamation Corporation, 1997). Kaiser held a California State Lands Commission-issued lease covering 145 acres of the mineral interest parcel. Since the lease expired in 2002, Kaiser applied to exchange the state's reserved mineral interest on the entire 467-acre parcel for a partial interest in a nearby mineral estate owned by Kaiser. The U.S.

³⁷ A mine adit is a horizontal shaft extending into the subsurface.

Ninth Circuit Court of Appeals issued a court ruling on November 10, 2009, that denied the proposed land exchange between Kaiser and BLM.³⁸

Our Analysis

The project area would be situated upon two largely inactive mining pits used by Kaiser to extract iron ore from the underlying bedrock and alluvial deposits. Eagle Crest does not propose to evaluate the project's potential effects on the structural integrity of the two abandoned mining adits adjacent to proposed project area. However, we conclude that the structural integrity of the two mining adits could be potentially affected by project-related activities by blasting and other activities proposed during construction. Evaluating the potential project effects on these adits, including the potential for adit collapse, as part of the Eagle Crest's proposed subsurface investigations, would help clarify this issue and provide an opportunity for Eagle Crest to propose mitigation measures, if needed.

Reclamation of existing rock and ore materials from both recoverable and bedrock sources present within the proposed central project area would not be possible once the project is constructed and is in operation. The iron ore present beneath the project facilities, and specifically the reservoirs, would only become accessible for mining operations in the future if the project were decommissioned.

We estimate the potential economic value of recoverable iron ore at Eagle Mountain mine that would become inaccessible in the east and central pits once the project is constructed and operational would be between \$8 and \$13 billion. This estimate is based on the following assumptions: (1) the estimated monthly average value of iron ore in 2010 as published by USGS³⁹ (\$90 per dry metric tonne unit) and the International Monetary Fund⁴⁰ (\$146.72 per dry metric tonne unit); (2) that this price per iron ore unit would remain static in the coming decades because, despite the steady increases in price since about 2004, the price could potentially drop at any given point thereby making this price a conservative estimate with the available information; and (3) the amount of recoverable iron ore in the east and central pits to be about 33 and 64.6 million tons, respectively, as stated in Kaiser's comment letter on the draft EIS.

³⁸ See *National Parks v. BLM and Kaiser Eagle Mountain*, available at: <http://www.ca9.uscourts.gov/datastore/opinions/2009/11/10/05-56814.pdf>, accessed May 6, 2011.

³⁹ USGS 2011 iron ore statistics and information website, available at: http://minerals.usgs.gov/minerals/pubs/commodity/iron_ore/mcs-2011-feore.pdf, accessed May 6, 2011.

⁴⁰ IMF primary commodity process website, available at: <http://www.imf.org/external/np/res/commod/index.asp>, accessed May 6, 2011.

However, given that the mining equipment once used to extract and process iron ore at the mine has since been removed, the extraction, processing, and shipment of any recoverable mineral resources from the mine is not currently feasible without significant investment to replace the mining equipment. Additional permitting in accordance with the County of Riverside would be required because, as stated in the proposed landfill's draft EIS/EIR (CH2M HILL, 1996), the county has held that vested mining rights ceased to exist at the Eagle Mountain mine in 1983 when mining activities were stopped.

About 23.5 million tons of recoverable iron ore situated in the east end of the east pit is currently held by the California State Lands Commission and not owned or leased by Kaiser. Subtracting this 23.5 million tons from the estimated total amount of recoverable iron ore in the entire east pit (33 million tons) would reduce the amount of recoverable iron ore situated on Kaiser lands within the footprint of the proposed lower reservoir to be about 9.5 million tons, a value of between \$0.9 and 1.4 billion, based on the cost assumptions we have outlined above. Finally, according to information contained within the proposed landfill project's draft EIS/EIR (CH2M HILL, 1996), the County of Riverside has held that vested mining rights no longer exist at Eagle Mountain mine because iron ore mining ceased in 1983 and future mining of the site would require additional permitting in accordance with the mining ordinance of the county.

There is a potential for precious metals occurrence (e.g., gold, silver, or any of the minerals of the platinum group) within the process tailings presently located within the central project area; however, the precise locations and quantities are not wholly known (Behre Dolbear, 2000). Therefore, the effect of the proposed pumped storage project on limiting and/or preventing extraction of precious metals cannot be evaluated with confidence.

Any metals-enriched tailings or bedrock located beneath the footprint of the proposed landfill project would become inaccessible once the landfill is completed, unless removed from the footprint prior to and/or during landfill construction. The draft EIS/EIR of the proposed landfill project (CH2M HILL, 1996) does not provide an explicit estimate of the quantity of iron ore that would become largely inaccessible once the landfill is completed; however, it does show visually that the landfill would overlap with the known occurrences of iron ore (e.g., Phases 2, 3, and 5).

3.3.2 Water Resources

3.3.2.1 Affected Environment

Water Quantity

The proposed project is located in the Eagle Mountains and Chuckwalla Valley of the arid Sonoran desert of southeastern California. On average, about 3 to 5 inches of rainfall occurs annually. August receives the most rainfall, although rainfall is also more predominate, but generally lighter, in the winter months of December, January, and

February. The region's very low precipitation, high evaporation, and permeable soils preclude the existence of perennial streams. In rare large rainfall events, substantial runoff occurs in washes, causing flash floods with a great potential for erosion.

Eagle Creek, which is normally a dry wash, flows out of the Eagle Mountains generally along the southern side of the proposed central project area. USGS operated a gage on Eagle Creek (Gage No. 10253600, Eagle Creek at Eagle Mountain) near the project area from October 1, 1960, to September 30, 1966. Records from this gage, which had a drainage area of 7.71 square miles, are summarized in table 2. Flows were recorded at this gage on only 4 days when the gage was operational. The flows at this gage, which are representative of streams in the area, indicate a very flashy flow regime as shown by the large difference between the daily mean and the peak flow data. The total volumes of the 1961 and 1965 flood events were about 40 and 15 acre-feet, respectively.

Table 2. Summary of flow data (cfs) from USGS Gage No. 10253600 (Source: USGS, 2010, as modified by staff).

Water Year	Date of Flow	Daily Mean	Peak Flow
1961	August 23	20	380
1962	None	--	--
1963	September 17	0.2	3
1964	November 1	0	2
1965	August 16	7.5	180
1966	None	--	--

Under current highly disturbed conditions from the historical mining activities near the eastern mining pit, the majority of the flow in Eagle Creek enters the eastern mining pit where it accumulates and generally evaporates quickly. Eagle Crest estimates the total drainage area of Eagle Creek at 11.89 square miles. However, under current conditions, about 1.74 square miles currently flow into the central mining pit and about 2.85 square miles flow directly to the eastern mining pit and water is retained in both mining pits. The current drainage area of Eagle Creek at the point it flows into the eastern mining pit is about 7.3 square miles. Before mining activities altered the drainage pattern, Eagle Creek (with a drainage area of 11.89 square miles) discharged into the Chuckwalla Valley, with an abrupt change in gradient where the wash emerged from the Eagle Mountains. As the flow emerged at high velocities from the channeled wash area, the sediment bedload was deposited to braided alluvial fan where sheet flow and lower velocities occurred. The Colorado River Aqueduct is buried within the alluvial fan deposits of Eagle Creek to the east of the eastern mining pit.

Chuckwalla Valley is a closed watershed with a total drainage area of about 663 square miles, with two central sinks that form the Palen Dry Lake and Ford Dry Lake. During substantial rainfall events, runoff from areas near the project area reaches the Palen Dry Lake bed, forming a surface water feature that may persist for several weeks until lost by percolation and evaporation.

There are a few intermittent springs in the mountains within the northwest part of the Chuckwalla Valley. All of these springs appear to be hydrologically disconnected from the Chuckwalla groundwater basin since the springs are located in the mountains above the valley floors.

Water Quality

Water quality in the area is influenced by the site geology, including steep mountainous terrain; unconsolidated deposits in the valleys; the disturbed mine area; and sparse vegetation. The combined effect of these conditions and the rare, but normally intense, short-duration rain events lead to high sediment loads during runoff events. Surface water quality has not been monitored during the rare runoff events and access limitations have not permitted sampling of the water that sometimes collects at the bottom of the existing mining pits. Eagle Crest states that there likely to be a still-active wastewater treatment plant with a treatment pond on the southeastern side of the largely abandoned town of Eagle Mountain. In the Chuckwalla Valley, wastewater disposal occurs primarily through residential septic systems and treatment ponds that allow infiltration to groundwater.

Water Quality Standards

Water quality protection in the proposed project area is within the jurisdiction of the California Regional Water Quality Control Board, Region 7 (Regional Water Board). The Regional Water Board carries out these responsibilities through the Water Quality Control Plan for the Colorado River Basin within California (Basin Plan). This Basin Plan provides guidelines and regulations for activities that fall within Regional Water Board jurisdiction.

Water quality objectives are based on the water body's beneficial use classification (table 3). Under existing conditions, surface water rarely occurs and there is no current use designation. The State Water Board would assign use designations for the proposed water within the reservoirs and would approve the water quality certification for the project. We anticipate that the proposed project would receive the Hydropower and Industrial use designations from the State Water Board.

Table 3. Relevant beneficial use definitions for the Colorado River Basin
(Source: Regional Water Board and State Water Board, 2006).

Category	Definition
Hydropower generation	Uses of water for hydropower generation
Industrial service supply	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well pressurization.

Several water quality objectives applied to all water bodies within the Regional Water Board's jurisdiction for the Colorado River Basin are relevant to the proposed isolated, groundwater fed pumped storage project (table 4). Parameters and the important water quality objectives of the proposed project are shown in the table 4.

Groundwater Quality

Eagle Crest states that groundwater quality in the proposed project area is typical for desert areas of southern California. The pH ranges from about 7.4 to 8.5; total dissolved solids levels at 425–950 milligrams per liter (mg/L) are generally above the California maximum containment level of 500 mg/L (CH2M HILL, 1996); and sulfate and chloride are generally both below the maximum containment level of 250 mg/L (Kaiser Steel Resources, Inc., 1978). Boron, fluoride, and arsenic are commonly higher than recommended concentrations for drinking water. Samples from the wells in the Pinto and Chuckwalla groundwater basins had concentrations of boron at 600 and 938 micrograms per liter ($\mu\text{g/L}$) and concentrations of fluoride of 2.4 and 6.2 mg/L (Kaiser Steel Resources, Inc., 1978). While high, these concentrations seem typical for arid desert valleys in southern California. Human-induced groundwater pollution is low due to the undeveloped nature of the Chuckwalla Valley area, the limited infiltration of surface water, and the extreme depth to groundwater. Groundwater quality data from a well in the Upper Chuckwalla Valley are shown in table 5.

Table 4. Applicable water quality objectives for waters potentially affected by the proposed project (Source: Regional Water Board and State Water Board, 2006).

Parameter	Objective
Aesthetic qualities	Free from substances attributable to wastewater of domestic or industrial origin or other discharges which adversely affect beneficial uses not limited to: settling 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.
Toxicity	Free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or indigenous aquatic life.
Acidity	pH 6.0–9.0
Suspended solids and settleable solids	Discharges of wastes or wastewater shall not contain suspended solids or settleable solids which increase the turbidity of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Water Board that alteration in turbidity does not adversely affect beneficial uses.
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 Water Board that such an increase in total dissolved solids does not adversely affect beneficial uses of receiving waters.
Sediment	The suspended sediment load and suspended sediment discharge rate to surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

Table 5. Groundwater quality from the Upper Chuckwalla Well #1
(Source: letter from Separation Processes, Inc., Carlsbad, CA, to G. Gillin,
Senior Environmental Scientist, GEI Consultants, Inc., Sacramento, CA,
June 10, 2008).

Contaminant	Concentration (mg/L)
Calcium	16.5
Magnesium	1.2
Sodium	201
Potassium	3.2
Bicarbonate	74.3
Sulfate	240
Chloride	88
Fluoride	11
Nitrate (as N)	0.65
Arsenic	0.009
Boron	0.6
Silica	<20
Total Dissolved Solids	660
Total Suspended Solids	<20
Turbidity	<100 (NTU)
pH	8.5

Establishment of numerical objectives for groundwater quality involves complex considerations since the quality can vary with depth of well screening, existing groundwater levels, geology, hydrology, and other factors. In general, the stated objective of the Regional Water Board is to maintain the existing groundwater quality of all non-degraded groundwater basins. Table 6 provides the general groundwater quality objectives from the Basin Plan.

Table 6. Applicable groundwater quality objectives for the Colorado River Basin (Source: Regional Water Board and State Water Board, 2006).

Parameter	Objective
Taste and odor	Groundwaters for use as domestic or municipal supply shall not contain taste or odor-producing substances in concentrations that adversely affect beneficial uses as a result of human activity.
Bacteriological community	In groundwaters designated for use as domestic or municipal supply, the concentration of coliform organisms shall not exceed the limits specified in California Code of Regulations, Title 22, Chapter 15, Article 3.
Chemical and physical quality	Groundwaters designated for use as domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the limits specified in California Code of Regulations, title 22, chapter 15, article 4, section 64435, tables 2, 3, and 4 as a result of human activity.
Brines	Discharges of water softener regeneration brines, other mineralized wastes, and toxic wastes to disposal facilities which ultimately discharge in areas where such wastes can percolate to groundwaters usable for domestic and municipal purposes are prohibited.

Groundwater Resources

General Hydrogeologic Setting

The central project area is located in and adjacent to the Eagle Mountains on a bedrock ridge along the northwestern margins of the Chuckwalla Watershed (see figure 5). The central portions of the watershed contain the Palen and Chuckwalla valleys, with thick accumulations of alluvial sediments that comprise the Chuckwalla groundwater basin. Most domestic and agricultural areas are located in the western portions of the basin near Desert Center, about 10 miles south of the central project area. This area has been historically referred to as the Upper Chuckwalla Valley, while the Lower Chuckwalla Valley includes the valley area situated farther east of Desert Center and along Interstate 10.

The Chuckwalla groundwater basin receives both surface and subsurface inflow from the Orocopia groundwater basin to the west and from the Pinto groundwater basin to the north (California DWR, 2004a,b,c). The groundwater entering the Chuckwalla groundwater basin from the Pinto groundwater basin passes through a gap in the bedrock about 6 miles north of the project area. A portion of the Pinto groundwater basin is

within the JTNP, which is about 1.5 miles from the project area. The Chuckwalla groundwater basin drains east into the Palo Verde Mesa groundwater basin, which in turn drains into the Palo Verde groundwater basin. The Colorado River forms the eastern edge of the Palo Verde Valley groundwater basin. Although the Cadiz groundwater basin is adjacent to the north side of the Chuckwalla basin, it is hydrologically disconnected due to mountains that block the flow of surface and subsurface flow between the two basins. A few intermittent springs⁴¹ exist in the area of the northwest Chuckwalla Valley (see figure 5). None of the springs are documented as permanent, year-round springs (SCS Engineers, 1990, as cited in Eagle Crest, 2009a), and all are located in the mountains and not in the valley.

Traversing these basins and surrounding mountains is the Colorado River Aqueduct, which carries water west to highly populated areas of southern California (see figure 5).

Wells

There are more than 50 known wells in the Chuckwalla groundwater basin that provide water level data, as archived by USGS (2010), California Department of Water Resources ([California DWR] 2011), and USGS (2011) and as summarized in other studies (Eagle Crest, 1994; Eagle Crest, 2009a; CH2M HILL, 1996) (figure 7). Other agricultural or domestic wells may be present, but their locations are not known due to poor record-keeping, and some older wells dating back to the early 1900s may have been destroyed or abandoned (Eagle Crest, 1994; CH2M HILL, 1996). The depth of these existing wells range up to 2,000 feet and have pumping capacities up to 3,900 gallons per minute (gpm), with average pumping rates of 1,800 gpm. In the Desert Center area, groundwater wells range up to 900 feet deep; two of these wells are capable of producing 2,300 gpm each. In the JTNP, the Park Service owns one well in the southeastern portion of the Pinto groundwater basin (Pinto Well No. 2). The Metropolitan Water District reportedly owns two additional wells near the Park Service well, according to Park Service as stated in its comments on the draft EIS. There are also a few existing wells in the footprint of the proposed project near the eastern mining pit. Available water level measurements made in many of these wells⁴² have been used to construct historical groundwater level trends in the Chuckwalla and adjacent groundwater basins (see below).

⁴¹ A spring occurs where groundwater flows naturally from the subsurface onto the land surface due to the nature and relationship of rocks, the position of the water table, and the topography (Neuendorf et al., 2005).

⁴² Where possible, the identification number of a well referenced in this section is given in parenthesis, which is based on its geographic location within the local township, range, and section of the Public Land Survey System, San Bernardino Meridian (e.g., well 05S/16E-7P is located in Sec. 7, T5S, R16E).

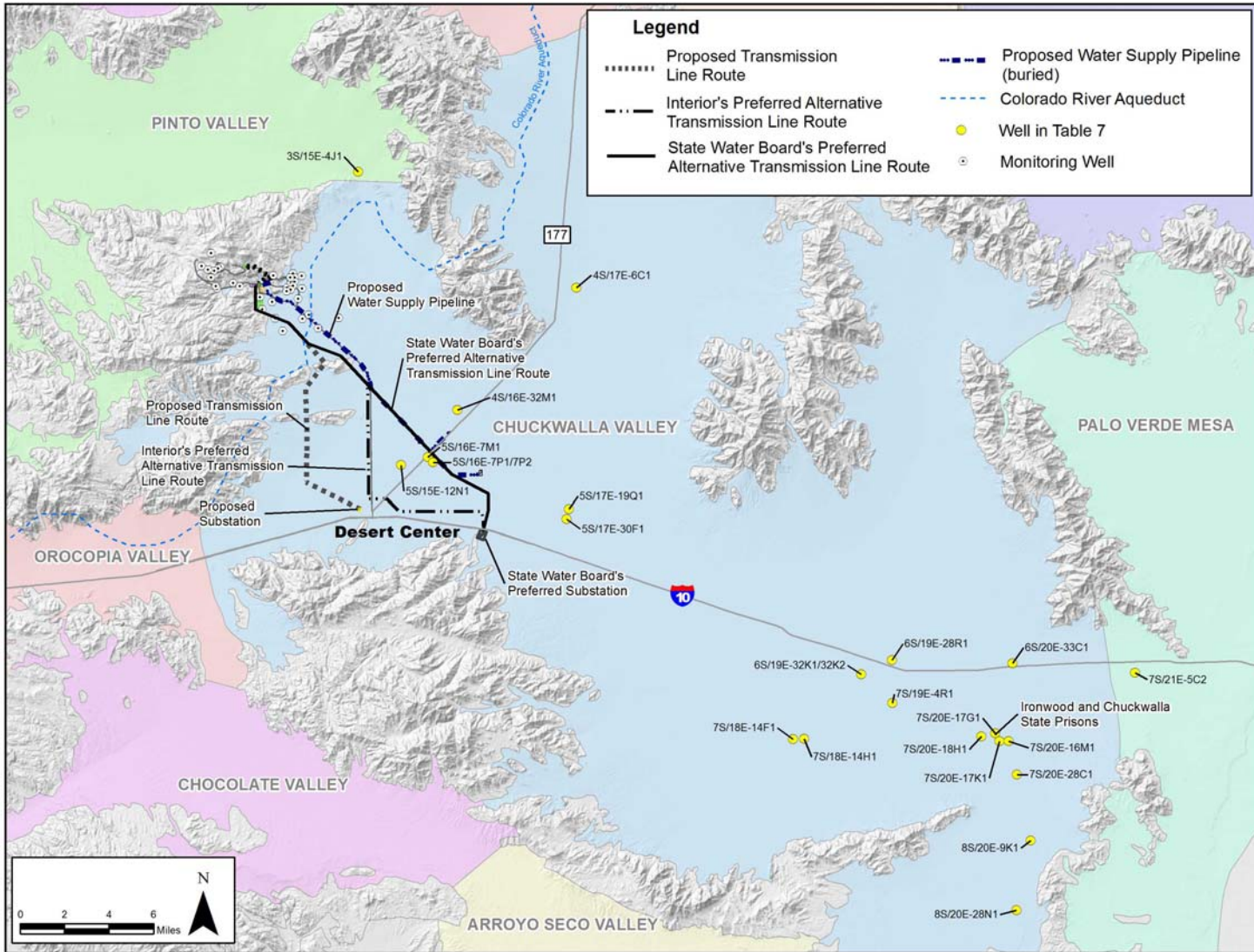


Figure 7. Location of wells with long-term groundwater level records in the Chuckwalla and adjacent groundwater basins (Source: State Water Board, 2010, as modified by staff).

Water-bearing Formations

Water-bearing geologic units in the Upper Chuckwalla groundwater basin include geologically young (<1.8 Ma) alluvium and continental deposits, which together has a maximum thickness of 1,200 and 2,000 feet in the central and eastern portions of the basin, respectively (see units Qs, Qal, Ql, and Qc in figure 6). However, California DWR (2004a) considers there to be only 1,200 feet of permeable sediments in the basin. These units are primarily composed of semi-consolidated coarse sand and gravel, clay, and some interbedded basalts.

Well log information was used by Eagle Crest to develop geologic profiles (i.e., subsurface cross sections) of the Chuckwalla groundwater basin to show the types of sediments and their distribution. The profiles, in addition to geophysical surveys in the Upper Chuckwalla groundwater basin (GeoPentech, 2003), suggest that the bedrock surface beneath the alluvial sediments forms a large bowl, where the southern edge of this bowl aligns with a narrow east-west trending bedrock ridge. The northern edge of the bowl is composed of a similar bedrock feature at the union of the Chuckwalla and Pinto basins.

The profiles show that coarse-grained sediments are continuous throughout the Chuckwalla groundwater basin, and because these sediment layers appear to be hydraulically connected, there is only one aquifer in most of the valley. This aquifer appears to be unconfined⁴³ based on the geology and measured groundwater levels. This aquifer may be semi-confined to confined⁴⁴ in the central portion of the valley near Desert Center where layers of clays have accumulated.

Hydraulic Characteristics

Information about hydraulic characteristics of the sediments in the Chuckwalla groundwater basin is derived from published reports and well log records. The key parameters of interest when evaluating an aquifer's ability to store and transmit water are provided and defined below:

- Hydraulic conductivity—The ability of the pore spaces or fractures in rock sediment to transmit water; typical values for well-sorted sand and gravel are from 3 to 180 feet per day (Fetter, 2001).

⁴³ An unconfined aquifer contains continuous layers of permeable materials extending from the land surface to the base of the aquifer; also referred to as a water-table aquifer.

⁴⁴ A semi-confined or confined aquifer is overlain by a confining layer, and therefore, does not have direct hydraulic connectivity with the land surface or the surficial aquifer. The impermeable layer is often composed of impermeable or semi-impermeable clays.

- **Storativity**—Or the storage coefficient, the volume of water an aquifer releases from or takes into storage per unit surface area or the aquifer per unit change in head. Storativity is equal to the specific yield in unconfined aquifers, like the Chuckwalla groundwater basin.
- **Specific yield**—The percentage of the volume of water a substrate will yield by gravity drainage to the volume of the substrate.

Hydraulic conductivity measurements of the Chuckwalla groundwater basin were obtained from historical records of aquifer tests for wells in the Desert Center area, the upper portions of the basin (east of the central project area) and in the Lower Chuckwalla groundwater basin. The measurements reveal that hydraulic conductivities in the upper portions of the basin (36 to 94 feet/day) are about half of those measured near Desert Center (111 to 139 feet/day). The bedrock portion of the project area near the proposed reservoirs has a much lower hydraulic conductivity because the bedrock is essentially impermeable, limiting groundwater movement to occur within faults, joints, and fractures. California DWR estimated the average specific yield of the Chuckwalla groundwater basin to be 0.10 for the upper 220 feet of saturated sediments (California DWR, 1979).

Groundwater Levels

Eagle Crest developed a partial trend in groundwater levels over the past 50 years by combining records from multiple wells in the Chuckwalla groundwater basin. These data represent historical water table elevations, extraction levels, and groundwater flow direction in the basin. A summary of groundwater level trends as recorded in water production wells in the basin is presented in table 7; the location of the wells are shown in figure 7. Groundwater levels in the Desert Center area were relatively stable until 1981. Between 1981 and 1986, thousands of acres were irrigated for the first time to support short-lived agricultural activities that resulted in groundwater level declines of about 130 feet. Groundwater levels between 1986 and 2002 have recovered by over 100 feet (wells 5S/16E-7P1 and -7P2), which is due in part to a large decrease in agricultural pumping. In addition, this recovery could be from increased groundwater inflows (from the steep gradients caused by or enhanced by the groundwater extraction) from the adjacent groundwater basins that contribute inflow. Full recovery of groundwater levels to pre-pumping conditions (i.e., before the 1960s) has yet to occur to date, and a slow recovery is likely because of continued, albeit lower, pumping in this area.

Current trends in groundwater levels in the eastern portion of the Chuckwalla groundwater basin near the outflow to the Palo Verde Mesa groundwater basin are conflicting—one well (7S/20E-18H1) shows a trend similar to the wells near Desert Center while another well shows the groundwater level recovering during the overdraft period of the early 1980s (well 7S/20E-28C1). This apparent conflict in groundwater trends may reflect differences in local use and the fact that the groundwater levels in the eastern portion of the groundwater basin were rising and were not affected by pumping

Table 7. Summary of groundwater elevation trends in the Chuckwalla and adjacent groundwater basins as measured in wells with long-term records (Source: USGS, 2011; California DWR, 2011).

Well ID ^a	General Location	Earliest Groundwater Elevation Prior to the Early 1980s ^b	Minimum Groundwater Elevation ^b	Most Recent Groundwater Elevation Since the Early 1980s ^b	Change in Groundwater Level Since the Early 1980s (feet)
6S/11E-16E1	Western end of Orocopia Valley	1,076 (1933)	1,073.6 ^c (1981)	1,074 (1994)	+0.4
6S/10E-N1		946 (1952)	944 ^c (1981)	945 (1985)	+1
3S/15E-4J1	Mouth of Pinto Valley	931 (1954)	909 ^c (1981)	918 ^d (2007)	+9
5S/15E-12N1	Northeast of Desert Center in agricultural area	498 (1961)	481 (1992)	488 (2000)	+7
5S/16E-7M1		483 (1961)	409 (1991)	425 (1994)	+16
5S/16E-7P1/7P2		490 (1952)	348 ^d (1986)	462 (2000)	+114
4S/16E-32M1	Palen Valley	477 (1961)	426 ^c (1984)	427 (1985)	+1
4S/17E-6C1		478 (1932)	473 (1982)	474 (1985)	+1

Well ID^a	General Location	Earliest Groundwater Elevation Prior to the Early 1980s^b	Minimum Groundwater Elevation^b	Most Recent Groundwater Elevation Since the Early 1980s^b	Change in Groundwater Level Since the Early 1980s (feet)
5S/17E-19Q1 ^e	East of Desert Center near Palen Dry Lake	462 (1961)	456 (1992)	456 (1992)	NA
5S/17E-30F1 ^e		466 (1961)	461 (1992)	461 (1992)	NA
7S/18E-14F1	Eastern end of Chuckwalla Valley	No data	263 ^c (1982)	293 (2000)	+30
7S/18E-14H1		No data	276 ^c (1983)	288 (2011)	+12
6S/19E-32K1/32K2		No data	280 (1992)	293 (2000)	+13
6S/19E-28R1		No data	272 (1990)	273 (1992)	+1
7S/19E-4R1	Eastern end of Chuckwalla Valley	No data	289.7 (1990)	279.5 (2000)	-0.2
6S/20E-33C1		No data	258 (1990)	257 (1992)	-1
8S/20E-28N1		No data	285 (1990)	285 (2000)	0
8S/20E-9K1		No data	281 ^c (1984)	281 (2000)	0

Well ID^a	General Location	Earliest Groundwater Elevation Prior to the Early 1980s^b	Minimum Groundwater Elevation^b	Most Recent Groundwater Elevation Since the Early 1980s^b	Change in Groundwater Level Since the Early 1980s (feet)
7S/20E-28C1		No data	258 ^c (1982)	270 (2011)	+12
7S/21E-5C2		No data	247.8 (2002)	248.1 (2006)	+0.3
7S/20E-18H1	Eastern end of Chuckwalla Valley at Ironwood/Chuckwalla prisons	275 (1961)	259 (1992)	259 (1992)	-14 since 1981
7S/20E-17K1		No data	252 (1987)	257 (1992)	+5
7S/20E-16M1 ^e		No data	251 (1992)	251 (1992)	NA
7S/20E-17G1		No data	241 (1987)	244 (2000)	+3

Notes: NA – Not applicable due to lack of data.

The early 1980s are representative of peak groundwater withdrawal for intensive agricultural activities.

- ^a Wells are generally listed in order of up-gradient to down-gradient location in the valley.
- ^b Elevation datum in NGVD29; year of measurement given in parenthesis.
- ^c Value indicates that the measurement was taken during the intensive agricultural water-use period of the early 1980s.
- ^d Source: State Water Board (2010).
- ^e No available data during the early 1980s; it is unknown whether groundwater elevation during the early 1980s was greater or less than the most recent measurement made after this period.

near Desert Center, but instead were more strongly influenced by pumping at the Ironwood/Chuckwalla state prisons located in that portion of the valley. Farther east in the Palo Verde Mesa groundwater basin, water levels showed little to no effects of pumping within the Chuckwalla groundwater basin.

In the Pinto groundwater basin, water levels remained stable until about 1960 when pumping by Kaiser in the Pinto and Upper Chuckwalla valleys lowered water levels by about 15 feet between 1960 and 1981 (well 03S/15E-4J1). Thereafter, groundwater levels began to recover, potentially due to Kaiser's greatly reduced pumping, even though groundwater levels near Desert Center declined in the early 1980s. Recent measurements taken in 2007 (Eagle Crest, 2009a), show that levels have continued to recover and are about 7 feet below the static water level measured in 1960, possibly due to withdrawals near Desert Center. These different groundwater level trends suggest that pumping in the Desert Center area does not substantially affect groundwater levels in the Pinto groundwater basin.

There are no well data for the eastern portion of the Orocopia groundwater basin near where it discharges into the Chuckwalla groundwater basin. However, there are well data for the western, or upper, portion of the Orocopia basin that indicate water levels have remained relatively stable between the 1930s and 1990s, but no measurements have been made since 1994.

Groundwater Flow Direction

Groundwater movement in the Chuckwalla groundwater basin is directed from the north and west toward the gap between the Mule and the McCoy mountains at the southeastern end of the basin and into the Palo Verde Mesa groundwater basin (California DWR, 2004a). More recent data near the central project area reveal that groundwater movement is both north and south from the Eagle Mountains toward Eagle Creek Canyon and then to the east until it reaches the basin aquifer, where it is then directed toward the southeast (CH2M HILL, 1996).

Groundwater Storage and Outflow

The total storage capacity of the Chuckwalla groundwater basin was estimated to be between 9.1 and 15 million acre-feet (California DWR, 1979; California DWR, 1975, as cited in California DWR, 2004a). The estimated storage for just the northwestern portion of the Upper Chuckwalla near the project site is about 1 million acre-feet (Mann, 1986). This estimate is probably very conservative because only 100 feet of saturated sediments were considered in the calculation, and there are several hundred feet of saturated sediments remaining. Using geologic profiles to assess the saturated thickness (about 150 feet) and assuming a storage coefficient of 0.10, the storage capacity of the entire basin (areal extent of about 605,000 acres) in only the coarse-grained sediment portion of the aquifer is estimated to be about 10 million acre-feet, similar to California DWR's 1979 estimate. This is probably another conservative estimate because it does not include water in the clay deposits nor does it account for additional water that may be

present in the confined or partially confined areas of the central portion of Chuckwalla groundwater basin. Outflow occurs only as groundwater movement, because no surface waters leave the basin. The groundwater basin discharge of the Chuckwalla groundwater basin to the Palo Verde Mesa groundwater basin is estimated to be about 400 acre-feet per year (California DWR, 1979).

The total storage capacities of the contributing Orocopa and Pinto groundwater basins have been estimated to be 1.5 to 6.25 million acre-feet and 230,000 acre-feet, respectively (California DWR, 1975; LeRoy Crandall and Associates, 1981, as cited in California DWR, 2004b).

Groundwater Pumping

The amount of groundwater pumped from the Chuckwalla groundwater basin has been estimated from recorded data filed with the State Water Board and by the acres and types of crops grown multiplied by the evapotranspiration rates of the plants. The recorded pumping over the years has been erratic and may be incomplete; estimates based on agricultural land usage, or water duties (evaporation plus applied water losses), were made between 1986 and 2007 (Eagle Crest, 2009a). The highest pumping occurred in 1986, at about 20,780 acre-feet per year, but has decreased substantially since the majority of the production of jojoba and asparagus ended shortly thereafter. Only about 25 percent of land once devoted to agriculture continues to be farmed.

Other pumping in the basin occurs for domestic and industrial use. Domestic use in the area is estimated at 50 acre-feet per year in Desert Center and 1,090 acre-feet per year at the Lake Tamarisk development. Southern California Gas Company uses wells to supply about 1 acre-foot per year to its natural gas pumping plant (from well 5S/16E-7P2). Farther east in the basin are the Chuckwalla Valley and Ironwood State prisons that were opened in 1988 and 1994, respectively, and are located directly adjacent to each other about 30 miles east of Desert Center. The two prisons pumped 2,100 acre-feet per year of groundwater in 2007 and recharged about 800 acre-feet per year of treated wastewater. However, populations at the prisons are projected to reduce by about 35 percent by 2011 to alleviate overcrowding, which would reduce the prisons' pumping to about 1,500 acre-feet per year and their recharge contribution to about 600 acre-feet per year.

Groundwater Recharge Sources and Perennial Yield

The majority of groundwater contained within the Chuckwalla groundwater basin is of ancient origin that likely derived from precipitation that was trapped with sediments as they deposited upon the valley floor over the past million years (Nishikawa et al., 2004; Eagle Crest, 2009d). Therefore, the oldest water is typically found at the bottom of the aquifer and the youngest water is found closer to the ground surface.

The Chuckwalla groundwater basin is recharged by percolation of runoff from the surrounding mountains (California DWR, 2004a). Average annual precipitation in the

basin is about 3 to 5 inches (California DWR, 2004a; PRISM Group, 2006). There are few measurements to quantify the amount of recharge from rain, and some studies estimated that only 5 to 10 percent of the rain falling on the watershed contributes to the groundwater, but recharge is generally limited to percolation of runoff from the surrounding mountains because rainfall does not infiltrate through the valley floor to the water table (Mann, 1986). The average recharge to the aquifer from precipitation was estimated at 5,400 to 5,600 acre-feet per year based on an assumed 5 to 10 percent infiltration rate into the surrounding mountains, which have a catchment area of about 255,370 acres (LeRoy Crandall and Associates, 1981, as cited in State Water Board, 2010).

The Upper Chuckwalla groundwater basin is also recharged by groundwater inflow from the north by the Pinto groundwater basin. Inflow from the Pinto groundwater basin occurs as outflow through an alluvium-filled gap at the east end of the Pinto basin. The perennial yield of the Pinto groundwater basin is estimated at 2,500 acre-feet per year (Mann, 1986). Recent estimates using geophysical studies to define the area where groundwater leaves the Pinto basin suggest the inflow may be as much as 3,200 acre-feet per year (GeoPentech, 2003).

Groundwater inflow to the Chuckwalla basin from the Orocopia basin has been conservatively estimated to be 1,700 acre-feet per year (LeRoy Crandall and Associates, 1981, as cited in State Water Board, 2010), but has been estimated to be as high as 6,200 acre-feet per year (LeRoy Crandall and Associates, 1981, as cited in California DWR, 2004b). Because there are no groundwater withdrawals in this basin, its outflow is considered to be all recharge to the Chuckwalla groundwater basin. Although not distinguished by groundwater basin, cumulative estimates of recharge from the Pinto and Orocopia groundwater basins are about 6,700 acre-feet per year (CH2M HILL, 1996), slightly lower than the average of the range of values stated above (i.e., 4,200 to 9,400 acre-feet per year).

The current perennial yield,⁴⁵ or natural recharge, of the Chuckwalla groundwater basin has been estimated as between about 8,900 and 20,000 acre-feet per year (Mann, 1986). Eagle Crest applied two methods to estimate recharge in the basin: the Maxey-Eakin method (Maxey and Eakin, 1949; Hevesi et al., 2002) and the Metropolitan Water District Review Panel method (State Water Board, 2010). The former method produced a low range of recharge values from 600 to 3,100 acre-feet per year, while the latter method, for which only mountainous areas of the basin were considered in keeping with the approach taken by the USGS in its study in the Joshua Tree groundwater basin (Nishikawa et al., 2004), resulted in recharge estimates between 7,600 and 17,700 acre-

⁴⁵ Perennial yield is defined by the California DWR (2003) as: “the maximum quantity of water that can be annually withdrawn from a groundwater basin over a long period of time (during which water supply conditions approximate average conditions) without developing an overdraft condition.”

feet per year, with a mean of 12,700 acre-feet per year. The former method has been found by others, including the USGS as part of its study of recharge in Death Valley (located to the north in a similar climatic and physiographic setting as Chuckwalla Valley) (Hevesi et al., 2002), to underestimate recharge rates because it generally oversimplifies certain input parameters and spatial scales. Therefore, the results generated from applying this method is considered to underestimate recharge in the Chuckwalla groundwater basin. The Metropolitan Water District Review Panel's method resulted in recharge rates that compare well with previous estimates reported in other published studies (e.g., Mann, 1986; Hanson, 1992, as cited in State Water Board, 2010). Based on the above information, a summary of the annual groundwater recharge estimates in acre-feet per year follows:

Precipitation:	5,400–5,600
Orocopia groundwater basin:	2,500–3,200
Pinto groundwater basin:	1,700–6,200
Total range:	9,600–15,000

In its comments on the draft EIS, the Park Service suggested that recharge rates in the Chuckwalla groundwater basin are substantially lower than Eagle Crest's estimate of 12,700 acre-feet per year and, further, that the recharge is likely between 3,300 and 6,000 acre-feet per year. The Park Service derived this estimate by using recharge coefficients determined by the USGS in its groundwater recharge study in the Joshua Tree groundwater basin (Nishikawa et al., 2004), which the Park Service states is more appropriate for use in the Chuckwalla groundwater basin than the Metropolitan Water District's Review Panel's method (developed in the Fenner groundwater basin, which is located to the north of Cadiz groundwater basin) that Eagle Crest used in its recharge analysis. The Park Service also stated that its lower recharge estimate is supported by declining water levels in a well located near Desert Center (well 5S/16E-7P1 and -7P2).

Overall, the Chuckwalla groundwater basin shares more physical similarities with the Fenner groundwater basin than with the Joshua Tree groundwater basin. For example, the total area of the Joshua Tree groundwater basin and contributing watershed (i.e., the surface-water drainage basin area) is a factor of five smaller than the Chuckwalla groundwater basin and contributing watershed—166,400 acres (Nishikawa et al., 2004) versus 860,368 acres (BLM, 2010c), respectively—whereas the area of the Fenner groundwater basin and contributing watershed is similar to the Chuckwalla basin and watershed—both are greater than 500,000 acres (California DWR, 2004e). Because average annual precipitation in all three basins is similar (about 3 to 5 inches; PRISM Group, 2006), this difference in areal size alone helps to explain much of the differences in groundwater recharge rates in the Joshua Tree and Chuckwalla groundwater basins.

The remainder of the difference in recharge rates in these two groundwater basins can be explained by considering that the Chuckwalla groundwater basin receives additional inflow from two adjacent sizeable groundwater basins (i.e., Orocopia and Pinto), while the Joshua Tree groundwater basin does not. The natural recharge to the Chuckwalla groundwater basin without the input from Orocopia and Pinto groundwater basins is about 5,400 to 5,600 acre-feet per year, which is closer to the recharge rate of 1,090 acre-feet per year for the Joshua Tree groundwater basin as estimated by the USGS in its 2004 study. Further, a comparison between recharge coefficients—the ratio of the total annual recharge estimate to the surface-water drainage basin area—for these two basins can be made. The Joshua Tree recharge coefficient equals 0.0068 foot per year (1,090 acre-feet per year divided by 159,801 acres) and the Chuckwalla recharge coefficient equals a similar value of 0.0064 foot per year (5,550 acre-feet per year divided by 860,368 acres). This agreement in recharge coefficient values for the two groundwater basins indicates that the analytical approach taken by Eagle Crest to estimate recharge in the Chuckwalla groundwater basin was as appropriate as the one taken by the USGS in its study of recharge in the Joshua Tree groundwater basin.

The Park Service states that Eagle Crest overestimated recharge rates in the basin because groundwater levels in the Desert Center area have not sufficiently recovered since the intensive agricultural pumping ceased in the 1980s. However, the Park Service places some of its analysis on wells 5S/R16E-7P1 and -7P2 (see table 7), which may not accurately represent contemporary water levels and, in turn recharge rates, for the entire groundwater basin. As discussed above under *Groundwater Levels*, these well data, however, represent the substantial amount of water level recovery that has been occurring since the 1980s in areas that experienced the greatest amount of historical drawdown. This water production well (now used by the Southern California Gas Company to supply its natural gas pipeline pumping plant) is situated near several other water supply wells that have been active for some time (e.g., well 5S/16E-7M1). This and nearby water supply wells continue to withdraw groundwater, and they likely have cumulatively created a localized cone of depression in the Desert Center area. This cone of depression has therefore maintained a lower water level as compared to the presumably higher water levels throughout much of the remainder of the groundwater basin. These water levels are not being influenced by the pumping effects still present near this concentration of wells. Therefore, it appears that the lack of full recovery of groundwater levels in all wells situated near Desert Center is due to their overlapping cones of depression from current water withdrawal, rather than a lower recharge rate in the basin.

Fishery Resources

No perennial streams are present in the project area. Intermittent surface water sources in the central project area and vicinity are Eagle Creek (a normally dry wash south of the central project area), other smaller unnamed washes, and temporary pools at the bottom of mine pits from stormwater runoff. Ephemeral springs within the vicinity of the central project area are Buzzard Spring, an unnamed spring near Buzzard Spring, and

Eagle Tank Spring. All of these water sources are temporary and seasonal and are not capable of supporting fish.

The Colorado River Aqueduct lies at the base of the largely inactive Eagle Mountain mine site. South of the central project area is a forebay (part of the aqueduct system) at the Metropolitan Water District's pumping plant. The Colorado River Aqueduct diverts water from Lake Havasu on the Colorado River, and fish species that may be present in the aqueduct system are the same as those found in Lake Havasu and the Colorado River. These species consist primarily of introduced game species including largemouth bass, striped bass, catfish (whitehead, bullhead, flathead, and channel), threadfin shad, green sunfish, black crappie, warmouth, and carp. Native species that may be present in the aqueduct are razorback sucker, bonytail chub, and desert pupfish. Although the Colorado River Aqueduct may support game fish, it is not legally accessible to the public and Eagle Crest does not plan to use water from the Colorado River Aqueduct.

3.3.2.2 Environmental Effects

Water Quantity

Effects of Operation on Water Quantity in the Reservoirs

Construction of the project and operation would result in changes to the amount of flow that reaches Eagle Creek during the rare events that runoff occurs in the area. Under current conditions, both existing mining pits retain the stormwater runoff that is directed to their locations. Under operational conditions, this stormwater would be added to water in the reservoirs, creating a possible excess amount of water in the reservoirs, depending on operational conditions and the amount of inflow.

In its letters filed April 27, 2009, responding to Deficiency No. 5 and AIR No. 4, Eagle Crest's summarizes its plans to release excess water from the reservoirs during large rainfall events, such as the 100-year event and up to and including the PMF. These measures are summarized below:

- During stormwater inflow to the lower reservoir, operations would be adjusted or curtailed to account for higher than normal water in storage. The amount of available energy storage space in the lower reservoir would be reduced from 17,700 acre-feet by the volume of runoff entering the lower reservoir in order to avoid spills at the upper reservoir due to pumping. The number of hours of on-peak generation would be reduced or curtailed during large (>200 acre-feet) runoff events.
- For larger inflow volumes (>200 acre-feet), the lower reservoir spillway would be operated to release, by gravity, the extra water in storage. This would be accomplished by keeping the water level in the lower reservoir above the spillway crest level by about 3 feet (reservoir at elevation 1,098 feet) with

releases of water from the upper reservoir through the turbines to the lower reservoir.

- During large inflow events, normal pumped storage operations would be interrupted until the excess water is removed from the reservoir system. Eagle Crest expects during this type of operation that one of the turbine units would be operated at its minimum flow rate (about 1,100 cubic feet per second [cfs]) for pre-arranged time periods. The attenuating effects of the reservoir would be adequate to maintain outflows close to 460 cfs on a continuous basis, with small reservoir storage level fluctuations above the spillway crest.
- These operations would cause the spillway to discharge 460 cfs. With no inflow, the reservoir would be drawn down by 1 foot in about 5.2 hours (ending with 3 feet of head on the spillway). This drawdown would allow minimum generation flow (1,100 cfs) to be released for about 2.7 hours until the spillway is discharging 460 cfs once again and then the operating cycle would repeat.

Eagle Crest states that this operational procedure after large flood events was designed based on a desire to have a relatively small amount of flow reach the alluvial fan balanced against the need to restore normal pumped storage operations in a reasonable amount of time following rare flood events.

Our Analysis

Runoff events in the project area are very rare and normally are of short duration with a limited amount of volume, as indicated by the historical gaging on Eagle Creek. Eagle Crest estimates that events producing inflows less than 200 acre-feet could be stored in the reservoirs to reduce the amount of make-up water needed. The 200 acre-feet could be stored in the lower reservoir without overtopping the proposed spillway, so normal operations could continue with inflow volumes less than 200 acre-feet. The upper reservoir could accommodate about 1,000 acre-feet without overtopping the spillway crest.

Eagle Crest estimated that a 100-year flood event would add about 2,000 acre-feet to the reservoir system. It would require about 2 days to remove this water from the two reservoirs following Eagle Crest's proposed operational procedures. With the proposed storage capacity of the upper and lower reservoirs, our calculations indicate that 2,000 acre-feet is about 11 percent of the excess storage that is available in the combined reservoirs. A pumped storage facility has the advantage that normally about half of the total active storage is available in one or a combination of the reservoirs at any time. Even though the estimated runoff during the 100 year event is only 2,000 acre feet, it is likely that the majority of this runoff would reach the reservoir system within a few hours, but would likely be less than the proposed total pumping or generation capacity (11,600 cfs) of the project. However, the exact timing would be a function of travel time in natural channels and the effects of attenuation by storage in the reservoirs. So it is

likely that even with minor operational changes and spillways designed for larger events than the 100 year event, no major effects on the project area are likely.

Eagle Crest estimated the PMF event would add an estimated 11,520 acre-feet to the reservoir system and estimated the recurrence interval of this event as about once every 10,000 years. In the event of a PMF type event, operational changes would be needed for about 12 days to discharge the excess that would accumulate in the reservoirs.

The analyses discussed here are based on preliminary designs. The project design could change prior to construction, which would affect the parameters used in the analyses. To ensure that any design changes would not increase the environmental effects of releasing excess water from the reservoirs, the design flood determination would be included in the Supporting Design Report, which would be reviewed and commented on by the Commission prior to start of construction. A likely dam break analysis and analysis design of flood conditions would be included in the emergency action plan, which would be submitted at least 60 days prior to initial filling of the reservoir in accordance with Part 12, Subpart C of the Commission's regulations.

Effects of Operation on Water Quantity in Eagle Creek and the Alluvial Fan

Project construction and operation would result in changes to the amount of flow that reaches Eagle Creek and the alluvial fan during the rare flood events. Under current conditions, both existing mining pits retain the stormwater runoff, which is directed to their locations and limits the amount of flow that reaches Eagle Creek and the alluvial fan. Under proposed conditions, some of this stormwater could reach Eagle Creek, depending on operational conditions of the project. The addition of this water to Eagle Creek could create higher peak flows in Eagle Creek between the upper reservoir and the lower reservoir and downstream of the lower reservoir along the proposed overflow discharge location. Existing berms and other structures that exist along the lower reaches of Eagle Creek appear to have been constructed during the mining operations to direct flood water away from the Eagle Mountain town site and other structures.

Eagle Crest's response to Deficiency No. 6 summarizes its conceptual plans for channel modification to contain the PMF within the Eagle Creek channel. Included in these conceptual plans are berms and other modifications to direct flood water to the lower reservoir and away from other existing or proposed structures during the PMF and lesser flood events. However, based on Eagle Crest's analyses of Eagle Creek, it does not currently propose any modifications to contain the PMF within the Eagle Creek channel.

Eagle Crest has also designed the spillway and discharge channel of the lower reservoir and proposes an operational plan to limit the release from the lower reservoir to 460 cfs for a period of 13 days after a PMF event.

Our Analysis

Eagle Crest estimated that the peak PMF discharge in the Eagle Creek channel is 17,380 cfs, including 15,320 cfs of unregulated runoff from the main 7.3-square mile portion of the watershed and 2,050 cfs from spillway operation at the upper reservoir, assuming that the upper reservoir is full to its normal pool at the onset of the flood.

This rate is based on an estimated peak PMF inflow to the upper reservoir of 4,640 cfs from its 1.7-square mile watershed, which would be attenuated to 2,050 cfs by storage above the spillway invert. Table 8 provides the estimated peak PMF flows at two locations under existing and proposed conditions.

Table 8. Peak flow (cfs) during the probable maximum flood (Source: Eagle Crest, 2009c).

	Existing Condition	Proposed Condition
Below the upper reservoir	0	2,050
Eagle Creek to lower reservoir	15,320	15,320
Total	15,320	17,370

Because of limited site access, Eagle Crest estimated hydraulic capacity at key locations of the Eagle Creek channel using available topographic mapping and aerial photos to provide estimated channel slopes and widths and to estimate flow depths and velocities at key locations. This analysis then used the two flow rates noted in table 8 for existing and proposed conditions in Eagle Creek. Based on the results provided by Eagle Crest from this analysis, the existing Eagle Creek channel should be adequate to convey PMF flows for existing and proposed conditions due to an increase in flow depth of about 0.4 foot and a velocity increase of about 0.9 foot per second, or about 5 percent. However, we note that especially in streams, such as Eagle Creek, substantial geomorphological changes are likely during large flood events, which could change the location and conveyance capacity of the channel. The flow velocities for Eagle Creek calculated by Eagle Crest indicate that during the PMF, velocities would range in the 16 to 18 feet per second range. Our calculations for smaller flood events indicate a flow velocity in Eagle Creek at more than 10 feet per second. Both of these ranges of flow velocities are capable of moving a large amount of sediment, gravel, and boulders and causing substantial erosion of existing and proposed structures and streambed conditions.

The average grade of the alluvial fan (which contains the buried Colorado River Aqueduct) in the vicinity of the lower reservoir spillway channel discharge point is about 2 percent. The water from the overflow spillway, at a proposed maximum rate of 460 cfs, is proposed to be conveyed through a riprap channel then discharged and spread across the alluvial fan during and after very large storm events such as the PMF.

Calculations by Eagle Crest indicate that the flow velocity in the unlined alluvial fan should be about 3 feet per second during the PMF. During a PMF type event within the watershed and the Chuckwalla Valley, the possible erosion downstream of the lower reservoir as a result of a flow of 460 cfs should be insignificant.

More detailed analyses would be required during final design of the project. At that time, precise topographic mapping would be available and physical reconnaissance of the Eagle Creek and the overflow spill path from the lower reservoir could be performed. Once this information is collected and the final designs are complete, the parameters needed for channel capacity evaluation and design of channel improvements and/or armoring could be determined.

Reservoir Level Monitoring

Operation of the reservoirs would cause water levels to substantially fluctuate on a daily basis. During peak electrical demand periods, water would be released from the upper reservoir to the lower reservoir, and during low demand periods, water would be pumped to the upper reservoir. Fluctuations of the reservoir levels would affect not only terrestrial issues but would also create operational and safety issues. Safety measures would include ensuring that over-pumping or over-generation does not occur, causing spillage from the reservoir's emergency spillways. Safety and compliance associated with the water levels of the proposed project would fall under Part 12 of the Commission's Division of Dam Safety and Inspections regulations. Eagle Crest did not propose a reservoir monitoring program in its license application.

Our Analysis

Eagle Crest proposes to transfer a maximum of 17,700 acre feet of water between the two reservoirs on a daily basis with the proposed hydraulic capacity of 11,600 cfs. Under proposed operations, the upper reservoir would fluctuate between a minimum water elevation of 2,349 feet and a maximum water level of 2,485 feet. The lower reservoir would fluctuate between a minimum level of elevation 925 feet and elevation 1,092 feet. The average amount of daily fluctuation would probably be less than the total variation between the minimum and maximum water levels. The elevation of the proposed spillway at the upper reservoir is also at elevation 2,485 and the spillway at the lower reservoir is at elevation 1,095 feet, 2 feet above the maximum water surface at the lower reservoir elevation.

Environmentally, the fluctuation of the reservoirs could have an effect on possible acid production from water interaction with the rocks surrounding the proposed reservoirs and the potential for water seepage from the reservoirs as discussed later in this section. In addition, the fluctuating water levels could affect the potential for invasive species occurrence in the reservoir areas, as discussed in section 3.3.3, *Terrestrial Resources*, and the access to water for desert bighorn sheep as discussed in section 3.3.4, *Threatened and Endangered Species*.

Project operations would require a dedicated and redundant system of monitoring to ensure that over pumping and over release of water for the proposed project would not occur and would need to follow regulations set by the Commission's Division of Dam Safety and Inspections prior to operation of the project. A reservoir monitoring program to address environmental issues would be less stringent and could include monitoring and documentation of reservoir levels at 15 to 30 minute and included in the project operation report.

Water Quality

Construction of the proposed project would increase the amount of disturbed soils available for mobilization during rain events and could affect sedimentation and turbidity. These effects are addressed in section 3.3.1, *Geologic and Soil Resources*. Operation of the proposed project could also result in increased salinity and acid levels in the reservoirs as the result of evaporation and the exposure of mining materials to water. This could potentially affect multiple water quality parameters within the proposed project area, as described in the following section.

Effects of Seepage and Evaporation from the Reservoirs and Brine Ponds on Groundwater Quality

Left untreated, the chemical components of the water lost to evaporation (dissolved minerals, nutrients, and other chemicals) would remain in the reservoirs, increasing dissolved mineral concentrations and decreasing water quality. Eagle Crest estimates evaporation losses from the reservoirs at 1,760 acre-feet per year. In addition, an estimated volume of up to 1,600 acre-feet of water per year would seep from the project reservoirs. Eagle Crest proposes to install a seepage recovery system to recover the vast majority of the seepage water. However, it is possible that due to interaction with native geological materials near the proposed reservoir sites, it is possible that the recovered seepage water would be of lower water quality than the replacement water that is expected from the pumping wells located near the town of Desert Center.

To maintain water quality within the reservoirs, Eagle Crest proposes to use a reverse osmosis treatment system that would remove water from the reservoir at a rate of 2,055 gpm (Measure GQ-1). This system would be designed to remove sufficient total dissolved solids to maintain the in-reservoir total dissolved solids at the average concentration of the source groundwater. The design of the reverse osmosis treatment system would comprise several pretreatment elements, including dissolved air flotation, automatic backwash screens, and a microfiltration system, to optimize treatment by the reverse osmosis process. Water would be removed from the upper reservoir, and treated water would be returned to the lower reservoir, and the concentrated brine from the reverse osmosis process would be directed to the proposed evaporation ponds. These ponds would cover about 56 acres and Eagle Crest estimates the total brine production at about 270 acre-feet per year. The proposed design for the evaporation ponds divides the total required pond area into six ponds of varying levels of salinity and five solidifying ponds. Each evaporation pond would be about 8.3 acres in size and each solidifying

pond would be about 1.4 acres in size. The discharge from the reverse osmosis system would flow into one pond and be directed to another pond while the solution remaining in the first pond evaporates. Proposed pond design includes clay or membrane liners along the bottom and the 8-foot-high berms to protect against seepage. Eagle Crest proposes to use monitoring wells to help identify a potential liner failure (Measure GQ-2).

Our Analysis

Without treatment, the water quality in the reservoirs would diminish because salinity levels would increase due to evaporative losses from the reservoirs. Reverse osmosis systems are capable of desalinating water and producing mineral-free water. Eagle Crest's current proposed design would operate at a 90 percent recovery rate (see table 9), the final reverse osmosis treatment step would produce 1,560 gpm of permeate to be returned to the lower reservoir, and 174 gpm of brine would be sent to the evaporation ponds.

Table 9. Expected reverse osmosis concentrations (Source: letter from Separation Processes, Inc., Carlsbad, CA, to G. Gillin, Senior Environmental Scientist, GEI Consultants, Inc., Sacramento, CA, June 10, 2008).

Contaminant	Reservoir Return Concentration (mg/L)	RO Concentrate (mg/L)
Calcium	< 1	170
Magnesium	< 1	12
Sodium	10	1,910
Potassium	0.2	30
Bicarbonate	7.5	650
Sulfate	3.5	2,400
Chloride	6	930
Fluoride	1.2	100
Nitrate (as N)	< 2	40
Arsenic	< 0.01	0
Boron	0.6	1
Silica	1	195
Total dissolved solids	30	6,450
Total suspended solids	0	0
Turbidity	< 0.5	< 5

Eagle Mountain's proposal to treat a sufficient volume of reservoir water to maintain water quality comparable to the source water should prevent degradation of water quality from salinity increases that would occur otherwise. To achieve this goal, Eagle Crest's proposal includes treating 3,315 acre-feet of reservoir water each year. According to Eagle Crest, this procedure would result in the production of about 2,500 tons of dry salt in the brine ponds each year. It is anticipated that the time required to concentrate dissolved solids in the reservoir to levels considered a degradation of water quality would take longer than any reasonable reverse osmosis system downtime scenario involving maintenance or repair. We also discuss potential effects of salt management in section 3.3.5, *Recreation, Land Use, and Aesthetics*, in the subsection *Land Use*. In addition to removing salts from the water, most other contaminants (e.g., microbes), nutrients, and minerals would be removed as well. Therefore, eutrophication is not expected to occur because the water quality in the reservoirs would be maintained.

The storage of brine in the surface ponds poses some risk to surface and groundwater quality. Brine pond leakage could pose a distinct threat to water quality. Failure of the pond wall or liner represent possible scenarios related to an accidental release of brine to the surrounding environment. Based on expected brine volumes and the surface areas of the six individual evaporation ponds and a wall height of 8 feet, it is expected that a maximum of about 45 acre-feet brine volume would be stored in each evaporation pond.

In the event of a pond wall failure, concentrated brine could wash out of the pond, resulting in surface flow. This type of a failure would release the brine, with high concentrations of salts and other minerals onto the soil, potentially harming vegetation. We estimate that the brine from a possible pond wall failure would affect a limited area and would not reach the Colorado River Aqueduct, which is buried and about 2.4 miles downgradient from the proposed ponds. The exact amount of land that could be affected by an unlikely wall breach is difficult to estimate but would be determined by a number of variables, including the amount and height of liquid in the pond, the size and timing of the breach development, and the topography soil features down gradient of the pond. It is likely that after flowing a relatively short distance, the concentrated brine would percolate into the soil and eventually reach the groundwater as a plume after a largely vertical movement through the subsurface. However, the infiltration rate would be slow due to the low amount of infiltration from other sources, such as rain water. In addition, we expect that the percolation and movement of brine through the soil would be slowed by the effects of viscosity, density, and the attachment of brine particles to soil particles. In this area of the site, groundwater is about 500 feet below the surface with about 300 feet of alluvial deposits over bedrock.

Eagle Crest has not specified the exact type of double liners it is proposing, other than stating that they would be a clay and or membrane liner and would be designed and

constructed in accordance with Title 27⁴⁶ to prevent seepage. With a clay liner and concentrated brine, cation exchange⁴⁷ might be likely and this interaction could slowly increase the permeability of the clay liner. In the event of a pond liner failure, there would probably be a somewhat slow, continuous concentrated brine solution leak, which we expect would move slowly to the groundwater table. Once the brine plume reaches the bedrock or the groundwater table, the plume would begin to move more horizontally downgradient where it might be intercepted by a proposed monitoring well. Eagle Mountain proposes to install monitoring wells around the brine ponds detect such a failure. However, due to the great depth to groundwater and the largely vertical expected movement of a possible brine plume, a leak would probably be observed in the monitoring well only months or years after the leak began. In addition, once a leak is detected in the monitoring wells, a large plume of brine would be moving through the unsaturated zone.

With proper construction and maintenance performed on the evaporating ponds, the risk of such scenarios would be minimized. Because the opportunity to inspect and replace the pond liners would occur in association with salt removal (proposed every 10 years), it is anticipated that the ponds would reliably hold the concentrated brine solution during this time and that the risk of a wall or liner failure is considered small. Proposed monitoring methods for the brine ponds are analyzed under *Water Quality Monitoring* below.

With Eagle Crest's proposed reverse osmosis system in place, total dissolved solids levels in the reservoirs should be nearly the same as the source groundwater. Therefore, seepage of reservoir water into the groundwater aquifer would not degrade groundwater quality. Additionally, Eagle Crest proposes a series of seepage recovery wells to recovery the vast majority of possible seepage water from the reservoirs (Measure SR-2). Therefore, water lost by seepage from the reservoirs would not contribute to an increase in chemical component concentration in the reservoirs because water quality components of the reservoirs would be similar to the groundwater. Proposed monitoring methods for the reverse osmosis system and the reservoirs are analyzed under *Water Quality Monitoring* below.

Effects of Project Operations on Acid Production and Water Quality

The interaction between water stored in the proposed reservoirs and the surrounding exposed mine pit material could affect water quality by exposing minerals to surface water and oxygen. When the common mineral iron disulfide or pyrite is exposed, it reacts with oxygen and water (oxidizes) to form sulfate and acidic conditions. Under these conditions,

⁴⁶ California Code of Regulations, Title 27, *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste*.

⁴⁷ Cation exchange is the exchange of positively charged ions from the clay with the likely negatively charged brine solution.

the acidic solution can then interact with the surrounding earthen materials and leach out arsenic, copper, cadmium, silver, zinc, and other heavy metals. Acid rock drainage and acid mine drainage are terms that refer to the outflow of this water.

Quantitative information to determine if acid production would occur during project operations does not exist. Eagle Mountain proposes to implement a Phase 1 Pre-Design Site Investigation Plan to address this issue prior to final project design and construction. Implementation of this plan would involve collecting field samples and conducting analyses to determine the site-specific acid production potential and the net neutralizing capacity. Once access to the site is granted, Eagle Crest (2009b) states that the plan would include the following steps:

1. Obtain samples from each pit from the different the stratigraphic zones. The thickness of each unit as exposed in the pit would be measured or estimated to determine the percentage contribution of each unit to acid production.
2. Perform analysis for pyrite, and total sulfur, and sulfate sulfur.
3. Calculate acid production potential (APP).
5. Determine the neutralization potential (NP).
6. Calculate the net neutralizing potential (NNP): $NNP = NP - APP$ expressed as kg calcium carbonate/ton.

Our Analysis

Depending on many site-specific factors, the interaction between proposed project water and mine pit materials could result in acid production. Table 10 provides the primary, secondary, and tertiary factors that control acid production in mine environments (EPA, 1994). Currently, the lack of water is the single biggest factor limiting acid production at the project site.

Iron is the most important ore found in the mine pits and the primary minerals of this zone are magnetite and pyrite, and the secondary minerals are hematite and goethite (Dubois and Brummett, 1968, as cited in Eagle Crest, 1994). Some mineralogy data exist for the Eagle Mountain site in historical survey records; however, the quantity of pyrite and other sulfide minerals (necessary for acid production) is not well defined. About 170 million tons of iron ore reserves, considered economically recoverable at the time the mine was closed, remain at the entire Eagle Mountain mine site (Mine Reclamation Corporation, 1997). According to Eagle Crest, iron ore reserves are magnetite mixed with pyrite, or magnetite and hematite with small amounts of pyrite. Eagle Crest (2009b) indicates that the lack of site access precluded it from sampling the central and eastern

Table 10. Description of factors that control acid rock drainage (Source: EPA, 1994).

Factor Type	Description
Primary	Presence and type of: <ul style="list-style-type: none"> • sulfide minerals Presences of: <ul style="list-style-type: none"> • water • oxygen • ferric iron • bacteria to catalyze the oxidation reaction
Secondary	Presence and type of: <ul style="list-style-type: none"> • minerals that react acid produced, such as calcite and dolomite which neutralize the acid, or metals that change the character of the resulting effluent
Tertiary	<ul style="list-style-type: none"> • physical characteristics of the material • physical arrangement of acid producing and acid neutralizing materials • hydrologic regime

mining pits to calculate the amount of pyrite and acid rock drainage potential. Force (2001) reports that the lower ore zone of the central mining pit contains 10 to 50 percent platy pyrite, while earlier reports suggest pyrite ranges up to 10 percent, averaging 3 to 4 percent (Hadley, 1945). Because materials were removed during past mining operations, it is not clear what the composition of the remaining material is or the acid producing potential.

The proposed project would exhibit several of the EPA-listed conditions that can lead to increased acid production (see table 10). Operation of the reservoirs would raise and lower water levels, resulting in a well-mixed and oxygenated water column. Mineral composition and the buffering capacity of the surrounding materials and the groundwater would dictate the potential for acid rock drainage.

The buffering capacity of the surrounding materials and groundwater could offset the rate and concentration of acids generated in the reservoirs. The pH of groundwater proposed to fill the reservoirs is slightly basic (pH 7.4 to 8.5), which would help to neutralize acid production. According to Eagle Crest, historical mineralogy information from the site shows no evidence of high concentrations of toxic metals in the site

materials. However, specific measurements of the mineralogy and toxic metal content of the material that would come into contact with project waters have not been conducted.

Without samples to determine the amount of pyrite and other sulfides in the largely inactive mine pits, the extent of acid production is speculative. Implementation of Eagle Crest's proposed Phase 1 Pre-Design Site Investigation Plan would provide the data necessary to make quantitative determinations about the proposed project's effect on this aspect of water quality. Existing data suggest that acid generation could be limited due to the lack of sulfide minerals onsite and buffering capacity of the site material and groundwater.

Eagle Crest states that the proposed reverse osmosis system would not be designed for treating the pH of the water; however, in the event of an observed drop in pH, the system could be retrofitted to accommodate buffering agents to treat water returning to the lower reservoir. In addition, the permeable membranes in the reverse osmosis system would filter any metals, precipitates (solids separated out of solution as a result of a chemical reaction), and the microbes involved in the chemical reaction that results in acid production.

Water Quality Monitoring

Any leakage from the reservoirs and brine ponds could adversely affect groundwater quality at the Eagle Mountain site and the Chuckwalla groundwater basin, depending on the water quality, amount of leakage, and infiltration rate. Eagle Crest proposes a number of surface and groundwater monitoring efforts throughout the proposed area to help identify and minimize any adverse effects (Measure GQ-2). It specifically identified a number of wells to monitor depth to groundwater and proposes to monitor groundwater quality near the proposed reservoirs and brine ponds. Eagle Crest proposes to develop a monitoring program using measurements from reservoirs, seepage recovery wells, monitoring wells, and brine ponds on a quarterly basis for the first 4 years of operation.

Our Analysis

Monitoring the water quality of the reservoirs and groundwater quality throughout the area is necessary to determine the effectiveness of the reverse osmosis system and seepage recovery systems. It is also needed to ensure that the brine pond liners are not leaking and to provide supporting data related to seepage estimates. Figure 7 shows the network of existing and proposed wells that Eagle Crest proposes to use for groundwater monitoring.

Monitoring the water quality of the groundwater seepage would allow for the assessment of groundwater quality effects on the aquifer surrounding the project in the event of water quality degradation in project waters. Eagle Crest proposes to monitor groundwater quality in seepage wells and in monitoring wells upgradient and downgradient of the reservoirs. Having these data would allow comparison of background water quality with any possible changes due to project operation. Quarterly monitoring of the reservoir water quality would ensure that Eagle Crest could determine

the effectiveness of the reverse osmosis system. This monitoring would also alert Eagle Crest to water quality issues before similar water quality levels could be observed at the downgradient seepage recovery wells. Sampling could occur at the water supply pipe that feeds the reverse osmosis system, prior to the water undergoing any treatment, or the water could be sampled directly from the reservoirs.

It is likely that leakage from the brine ponds would not be measurable until months or years after the leakage starts due to the slow movement of the brine through the estimated 500-foot unsaturated zone above the groundwater table. Under these conditions, substantial brine pond leakage could occur before detection by the proposed groundwater monitoring wells. Partially horizontal monitoring wells that sample transects below the brine ponds and do not extend into the groundwater table could allow for early detection of any leakage by monitoring for a change in the moisture vapor content. Under typical circumstances, the moisture content in the monitoring well would remain low, except as the result of a brine pond leak.

In addition to leakage, an inadvertent sudden release of brine pond water due to a breach in a pond wall could pose a threat to water quality. It would be useful for evaporation potential to be monitored to ensure that the release of brine into the ponds is occurring at the appropriate rates. Also, brine pond water levels could be monitored to protect the structural integrity of the pond walls and to prevent brine from overtopping the walls. Automatic brine pond-level monitoring devices could be designed to prevent the system from releasing brine into the ponds when water levels threaten or exceed the pond's design capacity.

Water quality protection could be enhanced if Eagle Crest prepared and implemented a comprehensive water quality monitoring plan for the reservoirs, seepage wells, monitoring wells, and brine ponds. The plan could be developed in consultation with the Regional and State Water Boards, and could include location, depth, monitoring frequency, methods, reporting practices, and other parameters for the proposed water quality monitoring. This plan could also include monitoring of evaporation potential and possibly dedicated brine pond monitoring wells. Parameters of interest that could be considered for measurement are salinity, total dissolved solids, pH, silica, nitrate as N, sulfate, sulfur (total), calcium, magnesium, sodium, neutralization potential, acid-base potential, aluminum, arsenic, boron, cadmium, copper, iron, lead, manganese, mercury, molybdenum, selenium, and zinc. These parameters are representative of baseline parameters of the groundwater in the area. A comprehensive water quality monitoring plan could also include steps to be taken in the event of water quality degradation in the reservoirs or groundwater. If the project had a detrimental effect on the quality of groundwater, the monitoring measures proposed by Eagle Crest, combined with the additional measures that could be included in a comprehensive water quality monitoring plan, would allow for surface and groundwater quality degradation and effects to be identified soon after they developed. Such a comprehensive plan could also identify procedures for Eagle Crest to follow to consult with agencies about additional measures that could be implemented to address any adverse effects on groundwater quality.

Groundwater Resources

This section focuses on project-related effects on groundwater quantity, primarily as they relate to the potential effects of the project pumping and existing water uses in the basin. Project-related effects to groundwater quality from the reservoirs and brine ponds are presented above under the heading *Water Quality*.

Effects of Project Operation on Groundwater Availability

Pumping groundwater in excess of annual recharge would potentially result in lowering of the water table and reduction of groundwater outflow from the Chuckwalla groundwater basin. Eagle Crest developed a groundwater balance for evaluating the proposed project's effect on groundwater supplies. Eagle Crest estimates that over the life of the project, initial pumping, in the assumed start year of 2014, along with existing water uses (e.g., agricultural and domestic water supply), would exceed recharge of the basin by about 4,600 acre-feet per year for the first 4 years. Following this initial period, recharge would exceed project pumping and existing water uses by about 1,700 acre-feet per year because project pumping would be reduced to only provide reservoir make-up water. Total groundwater use by the project over a 50-year period, including water use for project construction, is estimated at 109,620 acre-feet.

Eagle Crest proposes two measures to minimize the effects of project pumping in the basin. These include:

- Groundwater Level Monitoring (Measure WS-1)—establish a groundwater level monitoring network (shown in figure 8), consisting of both existing and new monitoring wells, to confirm that project pumping is maintained at levels that are in the range of historic pumping and assess changes in groundwater levels throughout the basins, beneath the Colorado River Aqueduct, and in the Pinto groundwater basin, and
- Neighboring Wells (Measure WS-3)—monitor existing wells on neighboring properties to determine, in consultation with the State Water Board, whether project pumping during the initial reservoir filling period is adversely affecting those wells, and if so, replace or modify those wells and/or compensate the well owner for increased pumping costs. This measure was expanded in the State Water Board's draft EIR to additionally state that the adjacent, existing wells would be considered adversely affected if and when project pumping resulted in lowering water levels in those wells by 5 feet or more (State Water Board, 2010). This modified measure is herein referred to as Measure MM GW-2.

In its letter filed March 10, 2010, the Park Service recommends that Eagle Crest develop and implement a monitoring and mitigation plan to address the potential effects on groundwater resources in the upper Chuckwalla Valley and the Pinto groundwater basins.

Our Analysis

The initial reservoir filling during the first 4 years of project operation would result in adverse effects on groundwater storage and water levels because project pumping is expected to exceed recharge rates during this period. However, in the long-term, the effect of groundwater withdrawal by the project should not cause the aquifer to approach depletion. Project withdrawals over 50 years of project operation would total about 109,620 acre-feet or about 1 percent of the recoverable water in the Chuckwalla groundwater basin (estimated to be between 9.1 and 15 million acre-feet [California DWR, 1979; California DWR, 1975, as cited in California DWR, 2004a]). At the end of the potential 50-year license period, the aquifer storage, or cumulative change, would increase by about 74,000 acre-feet because recharge of the basin would exceed groundwater withdrawals for the majority of this period (i.e., after the initial reservoir filling period; table 11).

Table 11. Summary of existing and project pumping effects on groundwater storage in the Chuckwalla groundwater basin (Source: State Water Board, 2010, as modified by staff).

Time Period	Total Outflow (acre-feet per year)	Total Inflow (acre-feet per year)	Balance: Inflow Minus Outflow (acre-feet per year)	Cumulative Change at End of Time Period (acre-feet per year)
Current (2008– 2011)	10,043 to 10,651	13,531	2,880 to 3,488	12,150
Construction and initial reservoir filling (2012–2018)	10,351 to 18,120	13,531	–4,589 to 3,180	976
Normal operations (2019–2060)	11,806 to 11,810	13,531	1,721 to 1,725	73,422

Implementation of Measure WS-1 would effectively monitor groundwater levels in the Upper Chuckwalla groundwater basin. The proposed locations of the monitoring wells would effectively surround the three proposed pumping wells that would be situated near Desert Center. The proposed monitoring wells would also monitor groundwater levels along the boundaries of the basin to evaluate changes to the adjacent Orocochia Valley, Pinto, and Palen Valley groundwater basins. The proposed monitoring wells would be located on both private and public lands; securing permission to install and/or operate the wells on these lands would be a necessary element of this measure.

The effects of modifying Measure WS-1 (and WS-4) for the purpose of including the project pumping wells with the groundwater monitoring actions are discussed the subsections *Effects of Project Operations on the Regional and Local Groundwater Level and Flow Direction and Quality*.

Implementation of Measure WS-3 would allow Eagle Crest to use groundwater information from active wells on neighboring properties (thereby extending the monitoring network in the basin) and assess project-related effects on groundwater levels in those other wells.

If Eagle Crest were to continue implementation of Measure WS-3 beyond the initial reservoir filling period, it would allow Eagle Crest to ensure that any longer term effects of continuously withdrawing groundwater from the basin during operation of the project would be identified.

Measures WS-3 and MM GW-2 are discussed below under *Effects of Project Operations on the Regional and Local Groundwater Level and Flow Direction and Quality*. Both of these measures address the compensation of adjacent well owners who experience drawdown in their wells as a direct result of water withdrawals associated with the project.

Effects of Reservoir Seepage during Operations

The two proposed reservoirs and other water storage and conveyance features have the potential to seep water into the surrounding rock and soil substrates. Jointing and fracturing of the underlying bedrock and the general permeability of the rock and alluvial deposits could route seeped water from the reservoirs and other unlined structures downgradient (generally toward the east) to the sediments in the adjacent Upper Chuckwalla groundwater basin (Eagle Crest, 2009a). The eastern side of the lower reservoir would overlie alluvial sediments that have direct connectivity with the groundwater basin.

Eagle Crest proposes to implement several measures to monitor and manage seepage into the subsurface. These include:

- Seepage Recovery System from the Lower and Upper Reservoirs (Measures SR-1 and SR-2)—construct recovery wells downgradient from each reservoir and recover seeped water from the subsurface;
- Groundwater Monitoring (Measure SR-3)—develop and install a groundwater level monitoring network (different monitoring wells from those implemented under Measures WS-1 and WS-4) to confirm that seepage recovery well pumping is effectively managing groundwater levels in the project area, especially beneath the Colorado River Aqueduct and the proposed landfill;
- Groundwater Level Target (Measure SR-4)—maintain seepage from the upper reservoir below the bottom of the bottom liner of the proposed landfill and

from the lower reservoir to prevent a significant rise in water levels beneath the Colorado River Aqueduct; and

- Groundwater Monitoring (Measure SR-5)—perform groundwater monitoring activities on a quarterly basis for the first 4 years of project pumping, and thereafter depending on the findings, and submit annual reports to interested parties.

In addition to the described actions under Measure SR-1, Eagle Crest proposes to install one of the seepage recovery wells prior to project construction to perform an aquifer test. Eagle Crest proposes to conduct this test during the final engineering design to confirm the seepage recovery well pumping capacity and aquifer characteristics. With information from the aquifer test, Eagle Crest proposes to re-run the seepage recovery groundwater modeling⁴⁸ to determine the optimal locations for the remainder of the recovery wells. These wells are proposed to capture seepage water from the upper and lower reservoirs to limit possible groundwater level increases beneath the Colorado River Aqueduct, the proposed landfill, and other sensitive facilities. Eagle Crest's proposed adaptive management alternative to Measure SR-1 (i.e., SR-1A) is evaluated below under effects on the Colorado River Aqueduct. Eagle Crest further proposes to implement an adaptive management alternative (Measure SR-1A) involving the management of reservoir seepage to mitigate drawdown in the vicinity of the Colorado River Aqueduct, pending the initial findings of measures SR-1 and SR-5, and determination made through consultation with the State Water Board.

The Park Service, in its letter filed February 28, 2011, recommends that Eagle Crest conduct a performance pump test of the final seepage recovery system prior to reservoir filling to ensure that hydraulic control of the local groundwater can be achieved and to validate the seepage recover modeling results. The Park Service also recommends

⁴⁸ Details of the groundwater modeling that Eagle Crest performed to assess reservoir seepage rates and their effects on local groundwater levels, in addition to recovery via the seepage recovery wells, are described in the license application (Eagle Crest, 1994) and sections 12.5 and 12.6 of the State Water Board's draft EIR (State Water Board, 2010). In brief, the seepage analyses used the two-dimensional, finite element program ©GeoStudio 2007, specifically the ©SEEP/W module to estimate seepage rates and groundwater levels at specific down-gradient points of concern (e.g., CWA, landfill). Modeling of seepage recovery down-gradient of the reservoirs was achieved through the use of a numerical model built in MODFLOW-2000 (version 1.18.00)—a three-dimensional, finite-difference groundwater model developed by USGS. For both modeling analyses, the site-specific hydraulic characteristics used were based on the detailed data published in support of the landfill (e.g., CH2M HILL, 1996) and Metropolitan Water District (e.g., GeoPentech, 2003) projects. Several seepage control scenarios were modeled for the purpose of determining the most effective seepage control liner and recovery system.

that the results of the performance pumping test should be documented in a report to the Commission, State Water Board, and interested stakeholders.

In its letter filed February 28, 2011, the County Sanitation recommends that Eagle Crest develop either a target elevation for groundwater levels, performance standards, or an adaptive management approach to ensure that the expected reservoir seepage would not raise groundwater levels under the bottom of the proposed landfill and, specifically, that water levels do not come within 5 feet of the bottom of the landfill liners, per requirements of California State Code of Regulations 27 CCR § 20240(c).⁴⁹

Our Analysis

The proposed reservoirs would occupy two open, largely inactive mining pits that are underlain by bedrock and alluvium. As such, seepage from filled reservoirs is expected. Based on these hydrogeologic conditions in the project area, seepage could cause groundwater levels to locally rise, specifically beneath the nearby Colorado River Aqueduct and landfill. The rise of groundwater from seepage could potentially pose a subsidence risk from hydrocompaction⁵⁰ in the project area and vicinity. Up to 1,600 acre-feet of water is estimated to potentially seep from the project facilities annually if only limited seepage control improvements were made (State Water Board, 2010). The seeped water would generally flow down-gradient in an eastward direction toward the Upper Chuckwalla groundwater basin; however, it is possible that some of the water could follow bedrock fractures or fault traces that direct groundwater in other directions. Groundwater modeling results generated by Eagle Crest predict that groundwater levels beneath the lower reservoir would rise by about 4 to 12 feet, while levels in the vicinity of the Colorado River Aqueduct would increase by 3 to 6 feet. The proposed seepage control measures would consist of lining the reservoirs with fine tailings, lining the eastern portion (underlain with alluvium) with fine tailings and roller-compacted concrete, and installing a series of groundwater monitoring wells located downgradient from each reservoir for seepage monitoring and pump-back recovery. The water conveyance tunnels between the reservoirs would be lined with concrete and, in some locations, steel to prevent seepage from those features. Monitoring groundwater levels throughout the groundwater basin area, with emphasis on the areas downgradient from the proposed reservoirs and brine disposal pond, would allow Eagle Crest to measure direct project effects on local and regional groundwater resources. In addition, this information would help to evaluate whether project effects would adversely affect groundwater levels beneath the Colorado River Aqueduct and the proposed landfill and provide information to help determine if future mitigation procedures would be needed.

⁴⁹ See <http://www.calrecycle.ca.gov/Laws/Regulations/Title27/ch3sb2b.htm>.

⁵⁰ Hydrocompaction is the lowering of the land surface caused by consolidation and settling of soils under higher groundwater levels.

The construction and monitoring measures and mitigation measures proposed for the project are likely to be sufficient to control potential reservoir seepage effects on groundwater levels in the project area. However, if it is determined during onsite reconnaissance and subsurface investigations (to be conducted by Eagle Crest in support of its final engineering design) that the fine tailings available onsite are not suitable for lining the reservoirs alone (i.e., not sufficiently impermeable), Eagle Crest proposes to supplement the fine tailings used in the seepage blanket with imported materials, such as clay materials (e.g., bentonite) or even roller-compacted concrete or soil cement to further reduce permeability. Eagle Crest also proposes to grout bedrock fractures to further reduce seepage into these potential groundwater pathways, if needed. As part of the subsurface investigations, Eagle Crest plans to perform extensive laboratory analyses of samples taken of the fine tailings, including conducting geochemical analyses, which would help evaluate the effectiveness of these materials in controlling reservoir seepage. The results of the performance pump test of the final seepage recovery system (part of Measure SR-1) prior to reservoir filling should be documented and submitted for review by the State Water Board and filed with the Commission.

The expected seepage from the reservoirs could artificially raise groundwater levels beneath the proposed landfill project. Results of Eagle Crest's seepage modeling predict that in the absence of seepage recovery actions, groundwater levels could potentially come within about 100 feet of the existing ground surface (assumed condition: full reservoirs with applied 8-foot-thick liner with bedrock fracture grouting and/or rolled-compacted concrete treatment). Implementation of Measures SR-3 and SR-4 would greatly reduce the potential for artificially raised groundwater levels to come into contact with the existing ground surface, the Colorado River Aqueduct, and the deepest portions of the landfill. California State Code of Regulations 27 CCR § 20240(c), requires Eagle Crest to prevent artificially raised groundwater levels from encroaching within 5 feet of the bottom of the landfill liner.

Effects of Project Operations on the Regional and Local Groundwater Level and Flow Direction and Quality

The proposed use of groundwater for initially filling the two reservoirs and maintaining water volumes during project operation has the potential to adversely affect groundwater levels in the Chuckwalla groundwater basin. Depending on the extent of change in groundwater levels, changes could also affect the flow direction within the Chuckwalla groundwater basin and inflow and outflow from the connected areas of the adjacent groundwater basins.

Eagle Crest proposes several measures to monitor and manage groundwater pumping and reservoir seepage rates and levels throughout the basin for the purpose of minimizing the effects of project groundwater pumping on regional and local aquifer levels. As stated above under the topics *Effects of Project Operation on Groundwater Availability* and *Effects of Reservoir Seepage during Operations*, Eagle Crest proposes to implement Measures WS-1, WS-3, SR-3, and SR-5 to monitor and manage groundwater

pumping and reservoir seepage rates and levels. Additionally, Eagle Crest proposes to implement Measures WS-4 and SR-4 to more specifically focus on project effects on local and regional groundwater levels and Measure LF-1 to replace four existing wells located within the proposed reservoir areas (P-1, MW-4, MW-5, and MW-10; see figure 8). These measures would involve monitoring groundwater levels on a quarterly basis for the first 4 years of project pumping, and thereafter depending on the findings, and submitting annual reports to both FERC and the State Water Board to confirm actual drawdown conditions. Eagle Crest further proposes to implement an adaptive management alternative (Measure SR-1A) involving the management of reservoir seepage to mitigate drawdown in the vicinity of the Colorado River Aqueduct, pending the initial findings of measures SR-1 and SR-5, and determination made through consultation with the State Water Board.

Eagle Crest's proposed Measure WS-3 would involve monitoring existing wells on neighboring properties to determine whether project pumping during the initial reservoir filling period would adversely affect those wells, and if so, replace or modify those wells and/or compensate the well owner for increased pumping costs. This measure was expanded in the State Water Board's draft EIR Measure MM GW-2 to set a threshold of 5 feet or more when the adjacent, existing wells would be considered adversely affected.

In its letter filed February 28, 2011, the Metropolitan Water District recommends that Eagle Crest annually report the static water elevation at each of the project's production wells, along with a reference to either the Colorado River Accounting Surface, as proposed by the USGS in 2008 or to a valid accounting surface methodology set forth in future legislation, rulemaking, or applicable judicial determination. The purpose of this action would be to ensure that project pumping does not result in an unauthorized diversion of the Colorado River. The Metropolitan Water District additionally requests that Eagle Crest provide it all groundwater monitoring data and associated technical reports for its consideration.

Our Analysis

The proposed project pumping would potentially cause temporary overdraft of the Chuckwalla groundwater basin, causing local and regional groundwater levels to drop and flow directions to locally change. Overall, the initial reservoir filling during the first 4 years of project operation would result in adverse effects on groundwater storage and water levels because pumping is expected to exceed recharge rates during this period.

Eagle Crest's groundwater modeling⁵¹ indicates a predicted maximum groundwater drawdown of 50 feet near the pumping wells during the initial 4 years, but the drawdown would level off at about 14 feet thereafter. Drawdown of about 6 feet would occur at distances of 1 mile from the pumping wells. Along the Colorado River Aqueduct in the Upper Chuckwalla and Orocopia valleys, the modeled drawdown was about 3.6 to 4.3 feet. Groundwater levels could be lowered by about 3 to 4 feet at the mouth of the Pinto groundwater basin, with the amount of drawdown being less than this farther from the project area in the interior of the Pinto groundwater basin. Eagle Crest's modeling also estimated that after 50 years of project pumping, inflow from the Pinto groundwater basin would decrease by about 30 acre-feet per year compared to pre-project conditions.

Compared to maximum historical drawdown levels (over 100 feet) near Desert Center or at the mouths of the Orocopia Valley (presumed to be minimal) and Pinto Valley (about 15 feet) (see table 7), the maximum drawdown caused by the proposed project supply wells would be less than historical conditions, especially in areas more than 1 mile from the supply wells. However, the drawdowns could potentially exceed maximum historical conditions specifically beneath the Colorado River Aqueduct by 5 feet in the Upper Chuckwalla Valley and by 4 feet in the lower Orocopia Valley.

The USGS 2008 Colorado River Accounting Surface (Wiele et al., 2009) does not apply to the western portion of the Chuckwalla groundwater basin because: (1) this basin is not within the river's floodplain; (2) groundwater flow in the basin is directed east toward the Palo Verde groundwater basin, the Palo Verde Mesa groundwater basin, and the Colorado River (which remained in this direction even during the historically high groundwater pumping in the early 1980s); and (3) groundwater levels in the vicinity of the project's proposed pumping wells are currently around 450 feet above msl, making the levels about 200 hundred feet above the proposed accounting surface elevation of 240 feet above msl. Therefore, groundwater use by the project would not have an

⁵¹ Details of Eagle Crest's groundwater modeling performed to assess drawdown effects in the groundwater basin are presented in its license application (Eagle Crest, 1994) and section 12.4 of the State Water Board's draft EIR (State Water Board, 2010). In brief, a numerical model was employed that uses a Taylor, or infinite, series approximation of the Theis non-equilibrium well function (Theis, 1935; Fetter, 2001). The model assumes that the aquifer is homogeneous, isotropic, and infinite in nature. It simulates annually variable pumping rates at the project pumping wells and their effects on each observation point considered. Based on published data generated directly from the Chuckwalla groundwater basin, the aquifer characteristics incorporated in the analysis were hydraulic conductivity, saturated thickness, and storativity/storage coefficient, which spatially varied when modeling drawdown effects either near Desert Center, the Upper Chuckwalla Valley, or the Eagle Mountain mine.

adverse effect on the Colorado River Accounting Surface and, in turn, would not result in an unauthorized diversion of the Colorado River.

Eagle Crest's proposed measures include monitoring of groundwater levels throughout the basin, and Eagle Crest incorporates into Measure WS-1 additional components from the State Water Board's similar measure, Measure MM GW-1. Specifically, groundwater levels would not exceed the Maximum Allowable Changes thresholds as proposed in the State Water Board's draft EIR (table 12). Pumping rates for the initial fill of the reservoirs would be reduced to a level that avoids exceeding these thresholds if this is found to occur during groundwater monitoring activities. Eagle Crest estimates that the initial reservoir fill period could therefore be extended to a maximum of 6 years.

Table 12. Maximum Allowable Changes proposed for water levels in the groundwater monitoring network (Source: State Water Board, 2010, as modified by staff).

Type of Well	Well ID	General Location	Maximum Allowable Changes Threshold^a (feet)
Existing	3S/15E-4J1	Mouth of Pinto Valley	10 ^b
Existing	C-9	Upper Chuckwalla Valley near the Colorado River Aqueduct	11
Existing	5S/16E-25F1	East of Desert Center near Palen Dry Lake	13
New monitoring well	MW-109	Southeast of central project area near the Colorado River Aqueduct	14
New monitoring	MW-110	Upper Chuckwalla Valley near the Colorado River Aqueduct	12
New monitoring	MW-111	Palen Valley near the Colorado River Aqueduct	TBD ^c
New monitoring	MW-112	Lower Orocopia Valley near the Colorado River Aqueduct	9

Type of Well	Well ID	General Location	Maximum Allowable Changes Threshold^a (feet)
New water supply well	WS-1	Desert Center	51
New water supply well	WS-2	Desert Center	51
New water supply well	WS-3	Desert Center	51

^a Thresholds are subject to revision based on findings from the planned aquifer testing.

^b Equates to a minimum elevation of 909 feet, NGVD29.

^c Threshold has yet to be determined due to the likelihood of encountering bedrock above the water table and, therefore, depends on the depth of the monitoring well once completed.

Metropolitan Water District recommends modification of Measures WS-1 and WS-4 to include quarterly measurement and annual reporting of groundwater pumping production, water quality, and groundwater levels in the project pumping wells. This modification would revise these two measures to be more in-line with the similar measure (Measure MM GW-1) proposed in the State Water Board's draft EIR (State Water Board, 2010).

Eagle Crest's proposed Measure WS-3 and its additional components in the State Water Board's Measure MM GW-2 state that in the event that adjacent wells that are being monitored under Measure WS-3 experience a drawdown in their respective water levels by 5 feet or more, Eagle Crest would compensate the well owners. Based on the results of Eagle Crest's groundwater modeling, as summarized above, numerous wells identified in the Chuckwalla groundwater basin would potentially experience drawdown in excess of 5 feet, both during the initial reservoir fill period and through project operation. The number of existing wells that would be potentially adversely affected by project pumping is summarized in table 13. This information was based on a review of water well records summarized in Eagle Crest's final license application and the State Water Board's EIR (State Water Board, 2010). Of the wells listed in table 13, it is not known how many are active water production wells intended to provide water for domestic, agricultural, and/or industrial purposes. The well records summarized in Eagle Crest's final license application do indicate, however, that the majority of water production wells were installed during the brief agricultural boom period of the early 1980s in the Desert Center area when groundwater levels were substantially lower or were operational during that period. These well records also indicate that the majority of the monitoring wells were installed after the 1980s.

Table 13. Summary of water wells in the Chuckwalla groundwater basin that would potentially experience project-induced drawdown in excess of 5 feet (Source: Eagle Crest, 2009a, as modified by staff).

Project Pumping Time Period	Approximate Number of Existing Wells that would Potentially Experience Drawdown			Total Approximate Number of Wells that would Potentially Experience Drawdown >5 feet
	>20 feet	10–20 feet	5–10 feet	
Initial reservoir fill period (≤ 4 years)	2	24	36	62
After 50 years of project operation	0	2	43	45

Adjacent wells that were active during or have remained active since the 1980s would likely not experience adverse production, requiring well modification or replacement as a result of the proposed project pumping. Project-induced drawdown, either during the initial fill period or during the continued project operation, would not exceed historical drawdown levels. In the event that groundwater monitoring implemented under Measure WS-3 confirms Eagle Crest's modeling and shows that groundwater levels in these wells are being lowered by 5 feet or greater from present levels as a result of project pumping, Eagle Crest would compensate the owner of the affected well(s) for additional pumping costs or provide other mitigation measures, such as lowering the well pump or replacing the well. We note that the FPA, section 10(c), 16 U.S.C. 803, makes clear that a licensee of a hydropower project "shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works...."

In addition to potential project effects on groundwater levels, the pumping-induced groundwater depression could locally alter groundwater flow directions. Currently, groundwater flow is generally from the west and north and toward the south and east (California DWR, 1979; CH2M Hill, 1996). The project pumping is expected to temporarily increase the pumping depression near Desert Center, particularly during the initial reservoir filling period; however, project effects are not expected to substantially alter groundwater flow directions throughout the Chuckwalla groundwater basin given the following: (1) the relatively large size of the basin (about 45 miles across) in comparison to the size of the pumping depressions that are predicted to form at the three pumping wells near Desert Center; and (2) the total volume of water in storage (about 10 million acre-feet) in comparison to the substantially smaller volume of water that would be pumped during the initial reservoir filling period (about 32,000 acre-feet).

Modeling and detailed analyses have not been performed to investigate the possible changes in water chemistry due to the proposed pumping of supply wells for this project. However with the projected changes in groundwater levels and flow direction and the great depth to groundwater levels and limited natural infiltration, changes in the chemical or physical qualities of the groundwater are not expected due to the proposed withdrawal rates. In addition, the aquifer is unconfined and changes in the groundwater level would not cause a comingling of previously separated aquifers.

The local springs in the Eagle Mountains are not hydrologically connected to the nearby groundwater basins. As such, project pumping from the Chuckwalla groundwater basin would not affect the local, perched groundwater systems that feed these springs.

Implementing Measure WS-4, *Groundwater Monitoring*, Measure SR-4, *Groundwater Level Target*, and Measure LF-4, *Well Replacement*, would allow Eagle Crest to effectively evaluate groundwater levels and flow directions in the basin to confirm that project-induced drawdown and reservoir seepage do not exceed the Maximum Allowable Changes thresholds (table 13) during the initial reservoir filling period or adversely affect groundwater conditions in the basin following the initial reservoir filling. As stated in greater detail above under *Effects of Reservoir Seepage during Operations*, all groundwater monitoring data would be summarized into one annual report to be submitted to the Commission and the State Water Board. Eagle Crest would file the reports with the Commission, making them available to the public. Continued monitoring of groundwater conditions beyond the initial fill period would be decided upon through consultation with the State Water Board. Furthermore, active management of reservoir seepage to mitigate drawdown in the vicinity of the Colorado River Aqueduct (Measure SR-1A) would be decided pending the initial findings of measures SR-1 and SR-5 and determination made through consultation with the State Water Board.

Effects of Project Operations on Subsidence and Hydrocompaction

Groundwater pumping from three proposed supply wells in the Desert Center area and seepage from the proposed reservoirs have the potential to locally and regionally alter groundwater conditions in the project area and nearby groundwater basins. Subsidence could potentially occur as a result of project pumping if drawdown levels are substantial, typically greater than historical levels, causing the subsurface stratum to collapse. Subsidence could also potentially occur as a result of hydrocompaction of sediments wetted from reservoir seepage. This process has the potential to occur beneath the Colorado River Aqueduct because portions are located downgradient from the proposed reservoirs.

Eagle Crest proposes to implement Measure WS-2, *Subsidence Monitoring*, to measure the potential subsidence that could affect operation of the Colorado River Aqueduct. Two extensometers (measuring devices) would be installed along the Colorado River Aqueduct: one in the Upper Chuckwalla Valley (east of the proposed lower reservoir) and the other in the Orocopia Valley (southwest of the project area).

Eagle Crest developed Measure WS-2 through consultation with the Metropolitan Water District, operators of the Colorado River Aqueduct (Eagle Crest, 2010b). In the event that data show inelastic subsidence in the project vicinity as a result of project pumping, Eagle Crest proposes to eliminate inelastic subsidence by: (1) redistributing pumping by constructing additional water supply pumping wells and modifying the pumping rates to reduce drawdown; (2) reducing pumping; or (3) by artificially increasing recharge in order to better match the net annual groundwater withdrawal to the net annual recharge.

Our Analysis

There has been no reported evidence of subsidence in the project area (or along the Colorado River Aqueduct) to date; therefore, under proposed conditions, the potential for subsidence caused by project water supply pumping is low. Ground subsidence is not expected anywhere along the proposed the water tunnels between the proposed reservoirs because the tunnels would pass relatively deep below surface grade (bsg) within structurally competent bedrock and be lined with concrete and steel in some locations. The upper pressure tunnel would be at least about 100 feet bsg and the lower pressure tunnel would be at least about 950 feet bsg.

Project-induced groundwater changes should not lead to subsidence risks in the project area or vicinity. However, monitoring of the groundwater conditions and actual subsidence levels through the implementation of several measures, namely WS-1, WS-2, WS-3, WS-4, SR-1, SR-2, SR-3, SR-4, and SR-5, would help demonstrate that effects are as expected or would signal the need for corrective action. Under recommendations made in the State Water Board's draft EIR (2010), subsidence would not be allowed to exceed the Maximum Allowable Changes thresholds as gauged in the two extensometers. The threshold established for both extensometers is an eighth of a foot (0.125 foot). Through continued consultation with FERC and the State Water Board via the submission of final engineering designs and the annual groundwater monitoring reports, it may be determined that additional subsidence monitoring actions and/or active mitigation measures could be required to mitigate any predicted or measured subsidence risks in the project area and vicinity, especially those that could affect the Colorado River Aqueduct.

Fishery Resources

There are no existing water bodies in the project area capable of supporting fish populations. The project reservoirs would be hydraulically disconnected from any standing fish populations that could provide a potential source for fish migrating into the reservoirs. Eagle Crest proposes to use groundwater sources for the initial filling of, as well as subsequent additions to, the reservoirs, and these groundwater sources should not introduce fish or other aquatic resources into the reservoirs. It is possible that fish could be introduced through other means, including transport by birds; however, these events are expected to be extremely rare and unlikely to result in a breeding population. No measures have been proposed to ensure that the project does not affect fisheries.

Proposed project features, including the water pipeline, transmission line, and access roads, would cross several ephemeral washes. These streams are not federal jurisdictional waters under section 404 of the CWA, but do fall under the jurisdiction of California DFG. The state of California requires any person, state, or governmental agency or public utility to notify California DFG before beginning an activity that would affect fish and wildlife by (1) substantially diverting, obstructing, or changing the natural flow of the bed, bank, or channel of a river, stream, or lake, or (2) using material from or depositing material into a streambed. Such actions require a Streambed Alteration Agreement (Measure BIO-23).

California DFG can issue a Streambed Alteration Agreement only after the CEQA process is complete. Following completion of this process and once Eagle Crest has surveyed and staked all project features, Eagle Crest proposes to hold an onsite, pre-construction meeting with California DFG to determine specific locations where Streambed Alteration Agreements would be required. To minimize effects of the project on ephemeral washes, Eagle Crest proposes to avoid any disturbance within these areas to the greatest extent possible. In areas where some disturbance is required, the Streambed Alteration Agreement would stipulate that all construction in these areas is completed while the washes are dry. During water line construction, Eagle Crest proposes to recontour wash topography using and implement erosion control measures to prevent construction materials from being deposited in the channels. Finally, during restoration/revegetation activities along the linear ROWs, Eagle Crest proposes to recontour and grade disturbed areas to ensure that existing drainage patterns remain unaffected.

Our Analysis

Eagle Crest's proposal to consult with California DFG following completion of the CEQA process and prior to project construction to obtain Streambed Alteration Agreements in all areas where the project would affect ephemeral washes is consistent with California DFG policies and would adequately protect these areas from potential project effects on fisheries and streambeds.

3.3.2.3 Cumulative Effects

Groundwater use in the Chuckwalla groundwater basin for existing purposes (e.g., agricultural pumping and domestic water supply), the proposed project, the proposed landfill, and the proposed and potential future solar projects would have the potential to cumulatively reduce groundwater storage in the basin over the 50 years of the withdrawals for the proposed pumped storage project.

Existing water use in the basin is expected to continue during the foreseeable future, with a total of about 9,640 acre-feet per year (State Water Board, 2010). These uses include agricultural pumping (6,400 acre-feet per year), aquaculture pumping and open water evaporation (600 acre-feet per year), Desert Center domestic water supply (50 acre-feet per year), Southern California Gas Company's natural gas pumping plant water

supply (1 acre-foot per year), Desert Center raceway water supply (~3 acre-feet per year), Lake Tamarisk domestic water supply (1,090 acre-feet per year), Chuckwalla/Ironwood state prisons' water usage (1,500 acre-feet per year) (State Water Board, 2010). Return flow from wastewater released back to the aquifer from the town of Lake Tamarisk wastewater and the Chuckwalla/Ironwood state prisons is expected to be about 36 and 600 acre-feet per year, respectively (after 2011).

The proposed pumped storage project would require about 8,100 acre-feet per year during the initial reservoir filling period and about 1,800 acre-feet per year for reservoir replenishment water. Expected groundwater use of the proposed landfill project (and the Eagle Mountain town site) would range between 358 and 1,243 acre-feet per year. The water demand for the numerous solar power projects planned for the valley is estimated to be about 4,000 acre-feet per year and may reach 6,000 acre-feet per year during construction. Table 14 summarizes the expected water usage of the proposed solar power plants in the Chuckwalla groundwater basin. Table 15 summarizes the water balance showing the cumulative effects on groundwater storage in the basin. Additional details on the development of the water balance are presented in the Groundwater Supply Pumping Technical Memorandum attached to the State Water Board's draft EIR (State Water Board, 2010).

Table 14. Expected water usage by proposed solar plants in the Chuckwalla groundwater basin (Source: State Water Board, 2010, as modified by staff).

BLM Project Serial Number	Applicant (Project Name)	General Location in Chuckwalla Groundwater Basin	Planned Technology	Construction Water Use (acre-feet)	Operation Water Use (acre-feet per year)^a
CACA 048649	First Solar (Desert Sunlight Solar Farm)	Upper Chuckwalla Valley	Photovoltaic	126	55
CACA 048808	Chuckwalla Solar 1 (Chuckwalla Solar 1)	Desert Center	Photovoltaic	60	40
CACA 048810	Solar Millennium/ Chevron (Palen Solar Power)	East of Desert Center	Solar thermal	1,560	300
CACA 048880 ^b	NextEra/ Boulevard Association (Genesis/Ford	Ford Dry Lake	Solar thermal	2,440	200

BLM Project Serial Number	Applicant (Project Name)	General Location in Chuckwalla Groundwater Basin	Planned Technology	Construction Water Use (acre-feet)	Operation Water Use (acre-feet per year)^a
	Lake Dry Lake)				
CACA 049097	Bull Frog Green Energy (Mule Mountain)	Lower Chuckwalla Valley	Photovoltaic	85	12
CACA 049488	enXco, Inc. (Little Ford Dry Lake)	Ford Dry Lake	Solar thermal	1,222	180
CACA 049489	enXco, Inc. (Little Ford Dry Lake)	Ford Dry Lake	Photovoltaic	20	5
CACA 049491	enXco, Inc. (Eagle Mountain)	North of Desert Center	Solar thermal	1,222	180
CACA 049492	enXco, Inc. (Eagle Mountain)	North of Desert Center	Photovoltaic	20	5
CACA 049493	Solel, Inc. (Palen/McCoy)	Palen Dry Lake	Solar thermal	2,037	300
CACA 49494	Solel, Inc. (Desert Lily)	Palen Dry Lake	Solar thermal	2,037	300
CACA 050379	LightSource Renewables (Mule Mountain II)	Lower Chuckwalla Valley	Solar thermal	2,240	330
CACA 050437 ^c	Unnamed	Ford Dry Lake	Solar thermal	2,037	300
CACA 051017 ^c	Unnamed	Ford Dry Lake	Solar thermal	2,037	300
Total				17,742	2,507

Note: Additional data source for applicant name, project location, and planned technology information: BLM and DOE (2010).

^a It is assumed that the majority of the proposed solar developments would use dry cooling technology, which requires substantially less water compared with wet cooling technology, due to the need to maintain water efficiency standards in the state of California (BLM and DOE, 2010).

- ^b Project modified per CEC requirements to use dry cooling technology (CEC, 2010b).
- ^c Unnamed projects considered in State Water Board (2010), but not listed in BLM and DOE (2010); incorporated here to represent future solar projects without active applications at present.

Table 15. Summary of cumulative pumping effects on groundwater storage in the Chuckwalla groundwater basin (Source: State Water Board, 2010, as modified by staff).

Time Period	Total Outflow (acre-feet per year)	Total Inflow (acre-feet per year)	Balance: Inflow Minus Outflow (acre-feet per year)	Cumulative Change at End of Time Period (acre-feet per year)
Current (2008– 2011)	10,116 to 10,661	13,531	2,870 to 3,415	12,067
Construction and initial reservoir filling (2012–2018)	10,448 to 25,848	13,531 to 15,159	–10,689 to 3,083	–21,703
Normal operations (2019–2060)	14,677 to 18,381	15,159	–3,222 to 482	–88,577
Post-operations (2060–2100)	10,043 to 11,286	13,531	2,245 to 3,488	38,513

In summary, future groundwater use in the basin would have the potential to cumulatively exceed recharge by up to 3,200 acre-feet per year over the 50 years of the withdrawals for the proposed pumped storage project (2012–2060). By 2046, the aquifer storage, or cumulative change, would have been reduced by about 95,300 acre-feet, equal to about 1 percent of the total groundwater in storage in the basin (9.1 to 15 million acre-feet [California DWR, 1979, 1975]).

Other than electrical generation via wind power, which uses basically no water, existing and proposed electricity-producing facilities are located in nearby very arid areas that use or will use substantial amounts of water. About 45 miles east of the Eagle Mountains, near Palm Springs, the Sentinel gas-fired combustion turbine (a proposed peaking facility) has been approved. Combustion turbines use relatively small amounts of water, mainly for cooling the fuel/air inlet mix to produce the ideal conditions for maximum turbine power production. Functionally, combustion turbines are similar to the

Eagle Mountain Project in that both types of projects are used sporadically to meet peak load. Thirty-five miles to the east of Desert Center is the Blythe I Combined-Cycle Plant, a moderate water-use technology that uses the hot exhaust gases of a combustion turbine to produce steam to produce electricity. The energy efficiency of combined cycle is greater than a combustion turbine, but the water use is also higher. The largest nuclear power plant in the nation, the 3,942-MW Palo Verde Nuclear Generating Station is located about 130 miles east of the project and uses reclaimed wastewater from the city of Phoenix for cooling. Water use by the Palo Verde Nuclear Generating Station is about 78,000 acre-feet per year and is the only U.S nuclear plant not located on a large body of water. Table 16 shows that the water use per energy production for the Eagle Mountain Project is slightly lower than nearby natural gas facilities and much lower than the Palo Verde Nuclear Generating Station.

Table 16. Annual water use and energy production of different energy production facilities (Source: CEC, 2010a,b,c).

Project, Type	Water Use (acre-feet/year)	Rated Power (MW)	Acre-feet/ MW	Annual Energy Production GWh	Acre-feet/ GWh
Eagle Mountain, pumped storage	1,800	1,300	1.4	4,308	0.4
Sentinel, combustion turbine	1,100	850	1.3	2,383	0.5
Blythe I, combined cycle turbine	2,943	520	5.7	4,327	0.7
Palo Verde, nuclear	78,000	3,942	19.8	29,250	2.7

Cumulative groundwater pumping in the basin is expected to cause about 5 feet of additional drawdown in the areas of the basin where pumping by the proposed pumped storage project would occur (State Water Board, 2010). Over the potential 50-year life of the project, the resulting cumulative drawdown is predicted to exceed the maximum historical drawdown by 7 feet beneath the Colorado River Aqueduct near the central project area, and 6 feet and 1 foot at the mouths of the Orocopia and Pinto valleys, respectively. Overall, the maximum historical drawdown would not be exceeded in the Desert Center area. Groundwater levels would recover following the potential 50-year project license period when project pumping has ceased, but the amount of recovery in the basin would depend on the magnitude and extent of continued pumping for other uses.

Recharge rates to the aquifer have the potential to decrease in the future while cumulative water needs may increase as a result of climate change. BLM and DOE

(2010) recently stated in their draft Programmatic EIS for the Solar Energy Development in Six Southwestern States that desert regions of the U. S. Southwest are projected to have more severe periods of drought during the remainder of the twenty-first century. However, no data are available about forecasted precipitation or evaporation rates specifically for the Chuckwalla Valley, or greater Mohave-Sonoran Desert region, that could be used in revising the cumulative groundwater balance for this project.

The subsidence potential remains low when considering the cumulative effects of pumping by the project, the existing groundwater users (e.g., agriculture), the proposed landfill, and the proposed and potential future solar projects in the region.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

During preparation of its license application, Eagle Crest conducted biological surveys along the proposed locations for the transmission line, water pipeline, and State Water Board's preferred alternative transmission line route and substation. These surveys, conducted in 2008, 2009, and 2010, included data collection on existing vegetation conditions and observations of state-sensitive and federally listed species. However, Kaiser did not permit Eagle Crest to access the central project area to conduct similar surveys. (The northern limit of the field surveys is depicted on figure 9.) Consequently, our assessments of the character of the affected environment within this part of the project are based on analysis of aerial photography and review of biological reports⁵² prepared for the Eagle Mountain Landfill EIS, as filed with the applicant's license application and in response to the Commission's AIR. In addition, we reviewed the license application filed in 1994 for the Eagle Mountain Pumped Storage Project (P-11080-000) and conducted an analysis of aerial photographs from 1997, 1998, 2010, and 2011.

⁵² These biological reports prepared for the Eagle Mountain Landfill EIS include: Brown. 1990. A survey for bats at the Eagle Mountain Project Site, Riverside County, California. June 27, 1990; Brown. 1991a. A winter survey for bats at the Eagle Mountain Project Site, Riverside County, California. February 15, 1991; Brown. 1991b. A summer survey for bats of the Eagle Mountain Project Site, Riverside County, California. October 27, 1991; Brown. 1992a. A winter baseline survey for bats at the Eagle Mountain Project Site, Riverside County, California. January 12, 1992; Brown. 1992b. Summer baseline surveys for bats at the Eagle Mountain Project Site, Riverside County, California. August 26, 1996; Divine and Douglas 1996. Bighorn sheep monitoring program for the Eagle Mountain Landfill Project: Phase 1 Report. July 1996. FWS. 1992. Biological Opinion for the Eagle Mountain Landfill Project (1-6-92-F-39). September 10, 1992.

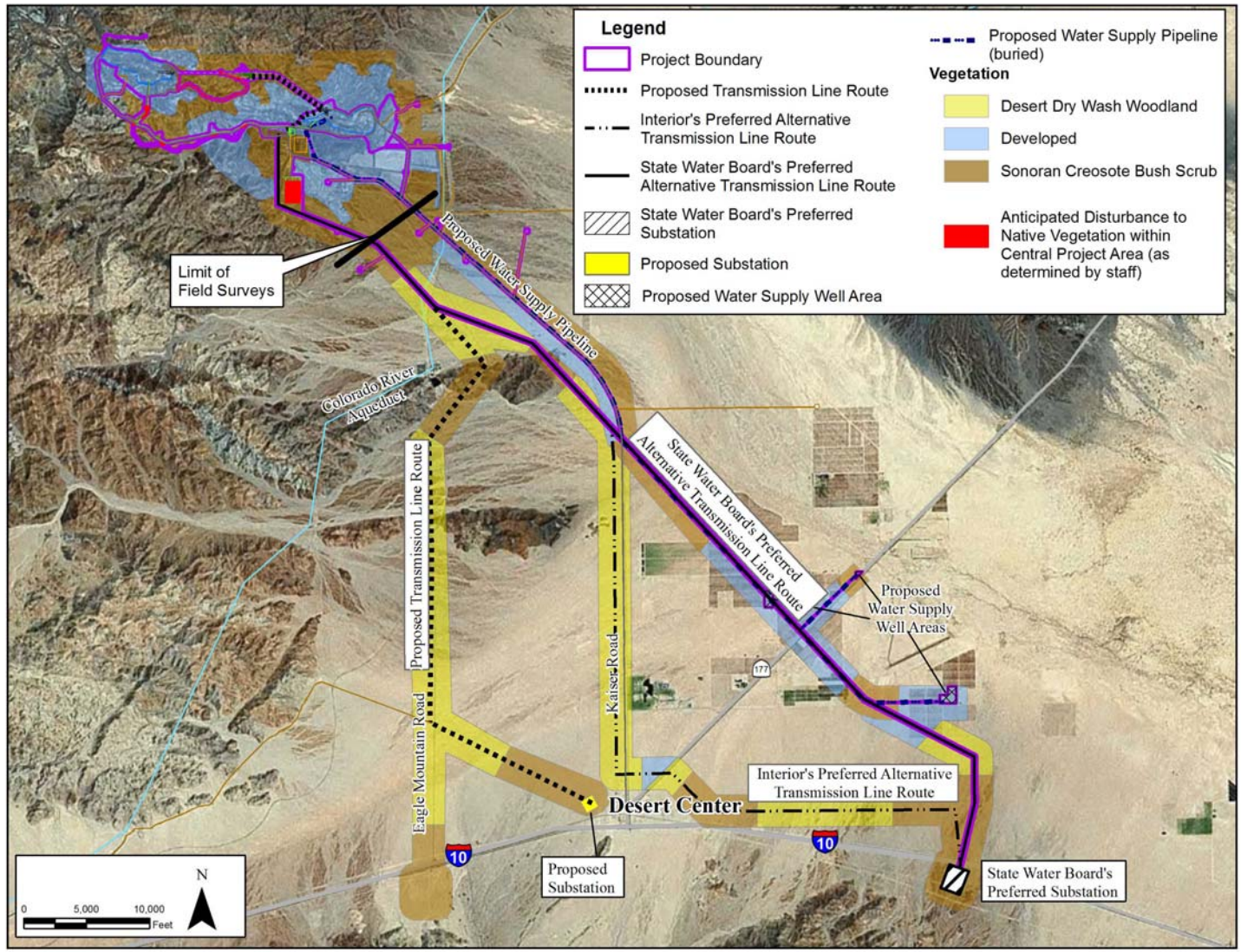


Figure 9. Vegetation in the project area and staff assessment of disturbance to native vegetation in the central project area (Source: State Water Board, 2010, and ESRI, 2010, as modified by staff).

Vegetation

The proposed project area lies in the California portion of the western Sonoran Desert, commonly called the “Colorado Desert.” This includes the area between the Colorado River Basin and the Coast Ranges south of the Little San Bernardino Mountains and the Mojave Desert. Rainfall amounts are low, about 3 to 5 inches per year. The project area is warmer and slightly wetter than the Mojave Desert and while rainfall may occur in the winter months, monsoon rains during the summer account for the majority of the rainfall. Winter temperatures average 54 degrees Fahrenheit (°F). Ambient, daily summer temperatures are extreme, commonly reaching over 110°F for long periods with an average of 90°F. This period of hot weather normally extends from mid-spring through the fall. As a consequence of these climatic conditions, the vegetation is highly drought-adapted, but also contains subtropical elements. In general, species richness and density are low due to the low rainfall and high temperatures, compared to more moderate environments or other regions of the Sonoran Desert.

In these hot and dry conditions, desert soils are generally slow to develop. In many areas, sand dunes limit species diversity. Cryptobiotic crusts, consisting of micro-organisms, including cyanobacteria and microfungi, help bind sand particles together and promote vegetation establishment. Cyanobacteria in the desert form filaments surrounded by sheaths. With summer or winter rains, these filaments become moist and active, moving through the soils, leaving behind a trail of the sticky sheath material. The sheaths stick to surfaces such as soil particles, forming an intricate webbing of fibers. In this way, loose soil particles are joined together, and otherwise unstable, highly erosion-prone surfaces become resistant to both wind and water erosion (Park Service, 2011a). When these areas are disturbed, soil mats can break back down to sand and blow away or be less suitable for vegetation. The extent to which these soil crusts are present within the project has not been quantified. However, they are likely to occur in most areas supporting native vegetation.

Along the broad alluvial fan traversed by the project’s proposed linear facilities, drainage is primarily characterized by scattered, well-defined washes and networks of numerous narrow runnels (sheet flow). The former are several-yards-wide, sandy to cobbly drainages that carry periodic runoff and are often a half to several yards deep, and vegetated along the banks by both shrubs and trees. By contrast, the numerous, shallow runnels are typically only a yard or less wide, one-to-few inches deep, and irregularly vegetated by locally common shrub species. Where there is greater runoff into these runnels, arboreal elements commonly seen in the larger washes are also present, but in a stunted form. Sheet flow is evident across alluvial fans where overland flows result from a combination of heavy precipitation, low permeability surface conditions, and local topography; the substrates there tend to be more gravelly than non-sheeting habitats due to the hydrologic transport of materials.

Two basic native plant communities exist in the proposed project area: Sonoran Creosote Bush Scrub and Desert Dry Wash Woodland. Creosote bush and burro bush

dominate the variations of Sonoran Creosote Bush Scrub that occur in the proposed project vicinity (figure 9). Other common species include brittlebush, white rhatany, several cholla species, indigo bush, and ocotillo. Desert Dry Wash Woodland occurs in broad plains of contiguous runnels (i.e., sheet flow) with intermittent, well-defined washes. For the latter, the wash banks and islands are densely vegetated with aphyllous (no leaves) or microphyllous (small leaves) trees, primarily ironwood and blue palo verde, with occasional to common smoke tree and catclaw. In the sheeting areas, the tree species are dominant elements of the landscape and appear to be homogeneous, forming a desert “woodland” (table 17). Other species commonly found in washes, including cheesebush, galleta grass, desert lavender, desert peach, chuparosa, and jojoba, grow in the arboreal drainages as well as the less distinct runnels.

Table 17. Acreage of native habitats and disturbed areas in the Eagle Crest-proposed project area (Source: Eagle Crest, 2009a, as modified by staff following analysis of aerial photography from 2010).

Project Element	Total Area	Sonoran Creosote Bush Scrub	Desert Dry Wash Woodland	Disturbed
Central project area (total acreage of reservoirs and constructed project features)	1,101.5	44.7	15.4	1,041.4
Reservoirs	354	0	0	354
Switchyard	12.3	0	0	12.3
Reverse osmosis pumping station	5.5	0	0	5.5
Staging and storage area	26.1	0	0	26.1
Desalination area	56.4	38.0	10.4	8.0
Eagle Creek channel modifications	5	0	5	0
Construction road	6.7	6.7	0	0
Additional grading, saddle dam construction, other activities	635.5	0	0	635.5
Water pipeline (30-foot ROW)	55.6 (15.3 miles)	20.9 (8.1 miles)	0 (0 miles)	34.7 (7.2 miles)

Project Element	Total Area	Sonoran Creosote Bush Scrub	Desert Dry Wash Woodland	Disturbed
Transmission line ROW (total area)				
Proposed	327 (13.5 miles)	167 (6.9 miles)	136 (5.6 miles)	24 (1 mile)
State Water Board's preferred alternative	400.5 (16.4 miles)	205.6 (8.4 miles)	97.6 (4.0 miles)	97.3 (4.0 miles)
Interior's preferred alternative	454.0 (18.6 miles)	177.0 (7.3 miles)	258.9 (10.7 miles)	18.1 (0.7 miles)
Tower footprint plus construction area				
Proposed	4.6–5.7 (54–68 towers)	2.1–3.3 (26–40 towers)	1.8 (22 towers)	0.4 (4 towers)
State Water Board's preferred alternative	5.5 (67 towers)	2.8 (34 towers)	1.3 (16 towers)	1.3 (16 towers)
Interior's preferred alternative	6.2 (75 towers)	2.5 (30 towers)	3.6 (43 towers)	0.2 (2 towers)
Access roads				
Proposed	32.7	17.7	13.6	2.4
State Water Board's preferred alternative ^a	26.7	14.7	9.7	2.3
Interior's preferred alternative ^b	45.4	20.5	9.8	9.7
Pulling/tensioning sites				
Proposed	Currently unknown (intended to fall within the transmission line ROW and substation site)			
State Water Board's preferred alternative				
Interior's preferred alternative				

Project Element	Total Area	Sonoran Creosote Bush Scrub	Desert Dry Wash Woodland	Disturbed
Equipment laydown sites				
Proposed	Currently unknown	Assume 0	Assume 0	Assume 100%
State Water Board's preferred alternative				
Interior's preferred alternative				
Interconnection collector substation				
Proposed	25	25	0	0
State Water Board's preferred alternative	NA	NA	NA	NA
Interior's preferred alternative	NA	NA	NA	NA
Total acreage (acres of project disturbance)				
Proposed	≥1428.5 (≥1,220.5)	≥211.7 (≥111.6)	≥151.4 (≥30.8)	≥1065.4 (≥1,078.9)
State Water Board's preferred alternative	≥1557.7 (≥1,189)	≥271.2 (≥83.1)	≥113.0 (≥26.4)	≥1,173.4 (≥1,079.7)
Interior's preferred alternative	≥1611.1 (≥1,208.8)	≥232.6 (≥88.6)	≥274.3 (≥28.8)	≥1,100.1 (≥1,086.0)

- ^a Disturbance areas associated with access roads along the State Water Board's preferred alternative transmission line route were calculated based on Eagle Crest's vegetation maps and under the assumption that the transmission line and water pipeline would share access roads where they are both within the 160-kV corridor.
- ^b Assumes the segment along Kaiser Road would be constructed on the west side of the road, inside of the Desert Wildlife Management Area (DWMA), and the segment along the Chuckwalla Critical Habitat Unit boundary would be constructed to the south and inside of the Chuckwalla Critical Habitat Unit in order to be on federal land.

The central project area (i.e., the area of the proposed reservoirs, switchyard, reverse osmosis system, brine ponds, and power plant) is located in the edge of the Eagle Mountains and on the adjacent gently sloping alluvial fan. Much of this area has been disturbed by prior iron ore mining activities and the related town site. Where vegetation is present, Sonoran Creosote Bush Scrub is the dominant vegetation type. Some Desert Dry Wash Woodland is also present in the Eagle Creek channel (figure 9).

The proposed transmission line would extend south from the central project area along the alluvial fan and over one very low mountain near the Metropolitan Water District's pumping plant. The northern 2.8 miles segment of the proposed transmission line would lie on Kaiser property, which has not been field surveyed. However, based on aerial photos and surveys that were completed along the accessible portions of the transmission line ROW, about 1 mile of the ROW would be on land disturbed by mining and 6.9 miles (167 acres) would be in Sonoran Creosote Bush Scrub. In the south, the proposed ROW traverses 5.6 miles (136 acres) of Desert Dry Wash Woodland (figure 9).

The proposed water pipeline would run southeast on the alluvial fan from the central project area, about 4.6 miles along the east edge of the Kaiser Road ROW through Sonoran Creosote Bush Scrub vegetation. The proposed water line then would run parallel to an existing 161-kV line ROW, initially through about 2 miles of Sonoran Creosote Bush Scrub vegetation and then through abandoned jojoba fields to State Route 177. A dirt access road is present along this portion of the route between Kaiser Road and State Route 177. At State Route 17, the existing ROW splits, with one route running along State Route 177, mostly through agriculturally developed parcels, but also through about 0.3 mile of native Sonoran Creosote Bush Scrub. The other ROW fork runs southeast along an existing dirt road, primarily through abandoned fields, but also through about 1.2 miles of Sonoran Creosote Bush Scrub. The combined acreage of native Sonoran Creosote Bush Scrub intersected by the proposed water pipeline ROWs is 20.9 acres (see table 17 and figure 9).

Noxious and Invasive Species

Several non-native noxious or invasive species are known to occur in the project area. These species include three grasses—red brome, cheatgrass, and split grass—and two dicots—Tounefort's mustard and filaree. These species frequently colonize disturbed soils associated with agricultural fields and roadsides. The occurrence of tamarisk (also called salt cedar) was also reported in the eastern mining pit in the 1990s, but it is not visible on recent aerial photography of the area. Tamarisk typically colonizes wet areas associated with invaded riparian areas, including springs, rivers, and canals, outcompeting native vegetation for available resources (Eagle Crest, 2009b). In comments on the draft EIS, the Park Service noted that soils in the Coachella Valley are above ambient nitrogen levels due to anthropogenic deposition from other areas in southern California. Therefore, this region may be more susceptible to invasion of noxious species because these species may be better adapted than native species to take advantage of the increased nitrogen levels.

Wildlife

Common wildlife species in the proposed project area are either migratory, and/or adapted to desert environments. In the habitats intersecting the proposed project, wildlife include ungulates, small and mid-sized mammals, birds, reptiles, and invertebrates. Common species include black-tailed hare, desert kit fox, coyote, bobcat, antelope ground squirrel, Merriam's kangaroo rat, desert woodrat, California leaf-nosed bat, pallid bat, western pipistrelle, California myotis, black-throated sparrow, California horned lark, ash-throated flycatcher, mourning dove, cactus wren, lesser nighthawk, red-tailed hawk, and turkey vulture. Common species specifically associated with drainages include desert mule deer, verdin, black-tailed gnatcatcher, and phainopepla. The project area also supports a high diversity of migratory birds that travel through the area between summer breeding sites and wintering grounds. For example, more than 250 species of birds have been recorded in JTNP (Park Service, 2011b), adjacent to the project area. It is likely that many of these species also occur in the vicinity of the proposed project. Common reptiles include side-blotched lizard, desert iguana, zebra tailed lizard, western whiptail, desert horned lizard, gopher snake, and coachwhip. Amphibians are comparatively uncommon in the area due to lack of permanent water and unreliable ephemeral water. However, a few species of amphibians (red-spotted toad and Pacific treefrog) may breed in ephemeral water sources as they become available during summer or winter rains. Common invertebrates in the project area include spiders, beetles, true bugs, wasps, and ants.

Operation of the Eagle Mountain mine created specialized habitats associated with the mine pits, surrounding mine shafts, and the Eagle Mountain town site. These habitats attract additional wildlife species that do not typically occur in undisturbed desert areas, or occur at much lower densities outside areas with human activity. Species occupying these areas include common raven, house sparrow, house finch, and European starling. Several bat species, including California leaf-nosed bat, Townsend's big-eared bat, and pallid bat, may now use the mine structures, and are generally intolerant of human activity.

Human Subsidized Predators

Increased human settlement in the arid southwestern United States is credited with an increased density of some predator species in this ecosystem, including ravens (Boarman et al., 2006; Knight et al., 1993) and coyote. Human settlement brings food and water subsidies to the desert environment and also adds new features to the landscape, like electricity and telephone line poles. These additions make the desert more habitable for wildlife species tolerant of human presence. While the increased density of these populations is dependent on human subsidies, their presence also creates increased predation rates on native wildlife including snakes, lizards, and the threatened desert tortoise.

During the last 50 years, human activities have substantially modified the desert environment in the vicinity of the proposed project. These modifications, in addition to the Eagle Mountain mine, include construction of the Eagle Mountain town site, the Colorado River Aqueduct, and the Metropolitan Water District's pumping plant and ponds associated with the Lake Tamarisk community. Landscape features associated with these developments include permanent supplies of standing water, electric and other utility lines, and potential food subsidies. These conditions are likely to subsidize resident populations of ravens and coyote. Both species are known to occur in the project area with some regularity; however, Eagle Crest has not conducted surveys for these species, and little is known about the current size of these populations other than that they are somewhat common. The anthropogenic water resources in the project area are openly available to birds, and Lake Tamarisk is also available to mammals. However, the open water sections of the Colorado River Aqueduct and the Metropolitan Water District's pumping plant are fenced to exclude large mammals. The water treatment plant at the Eagle Mountain town site is also likely fenced.

Naturally occurring water is also present near the project. The Northern and Eastern Colorado Desert Coordinated Management Plan (NECO Plan) identified six seeps, springs, or water catchments in the immediate vicinity of the project, all on or near the Metropolitan Water District's pumping plant (figure 10). Four of these water sources—Buzzard Spring, Dengler Tank, Eagle Tank, and Cactus Spring—are outside the proposed project boundary by at least 2 miles (CH2M HILL, 1996). All may be intermittent. The NECO Plan identified two other springs (unnamed), one of which might be adjacent to, in, or on the borderline with the project. However, investigations of these sites for the project Pre-Application Document (Eagle Crest, 2008) were unsuccessful in locating any further details on these springs. A May 1994 helicopter survey of all water sources in the Eagle Mountains also did not locate them (Divine and Douglas, 1996), and it is possible that they no longer exist or were incorrectly mapped. In the past, precipitation and runoff collected in the mine pits and a tamarisk (*Tamarix* sp.) grove grew in the east pit (Kaiser and MRC, 1991). Such water pools were also known sources of water for the bighorn sheep that frequented the mine pits when water was available (Eagle Crest, 1994). Presumably other animals used this water source as well.

Sensitive Species

Several species known to occur on or in the vicinity of the proposed project are accorded special status because of their recognized rarity or potential vulnerability to extinction. Frequently, they have an inherently limited geographic range and/or limited habitat. Some are state-listed as threatened or endangered and receive specific protection as defined in one or both of the federal ESA or California ESA. Candidate species for listing, species designated as "Species of Concern" or "Sensitive" by state or federal

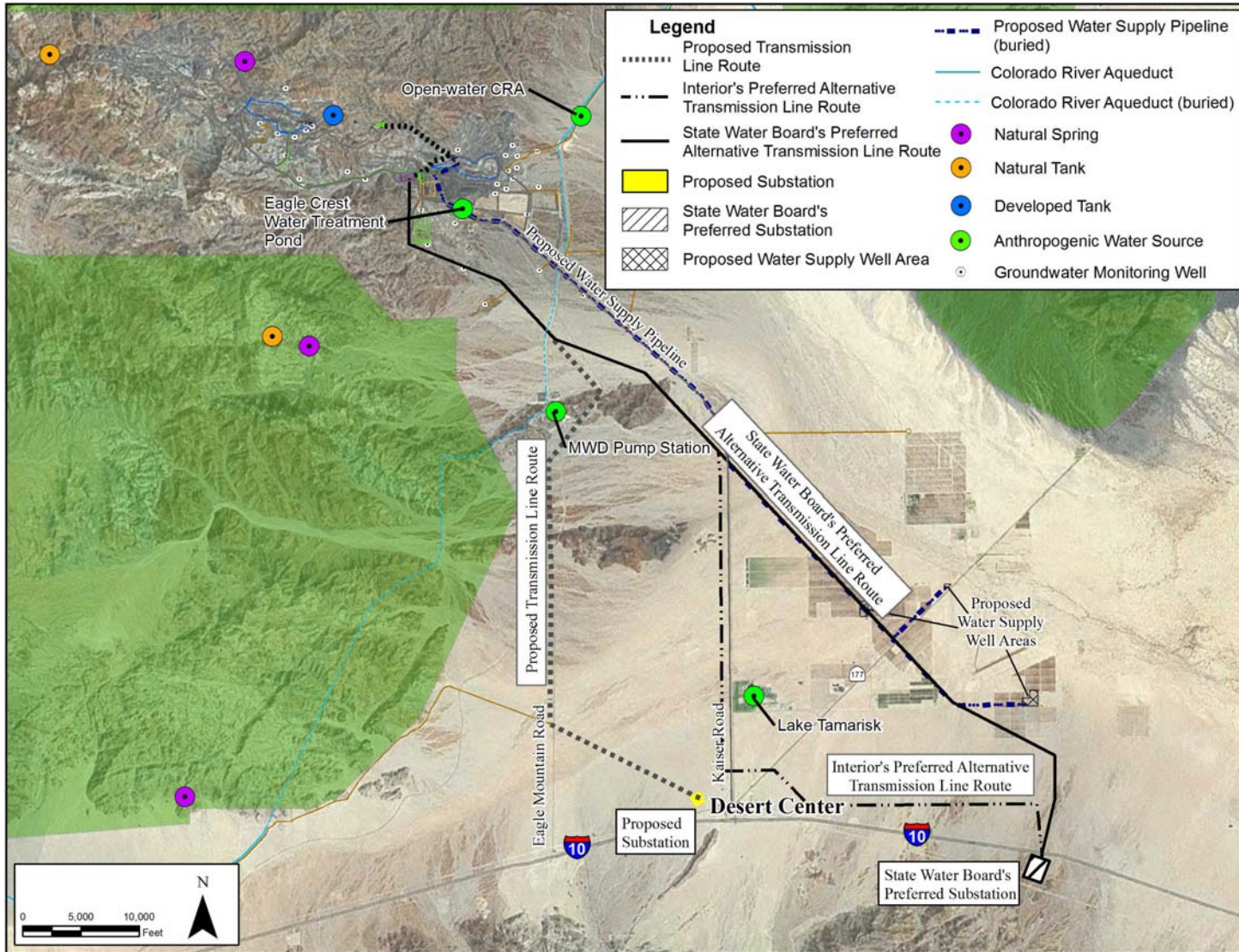


Figure 10. Water sources in the project area identified in the NECO Plan (Source: State Water Board, 2010, and ESRI, 2010, as modified by staff).

agencies, and plant species from Lists 1A, 1B, and 2 of the California Native Plant Society (CNPS), are protected under CEQA. These species are referred to collectively as special-status species.

While plant species from CNPS lists 3 and 4 are watchlist species and generally not included for special-status consideration, several species from these two lists have been included by the NECO Plan as species for which surveys must be completed where a project intersects the species ranges, as mapped in the NECO Plan. Therefore, these plants are also included in the list of special-status species for the proposed project. Similarly, any wildlife species listed by the NECO Plan as special-status, even if not otherwise considered special-status, is included. Finally, two species (burro deer and bighorn sheep) in the project area receive protection and management as game species, and burros are afforded protection by the Wild, Free-Roaming Horse and Burro Act.

Special-status plant and wildlife species that may occur or have been documented to occur in the project vicinity and have potential to be affected by project activities are listed in table 18. This list includes only those species with the potential to be found in the area of project components, not all special-status species that are regionally known. The list is based on: (1) records of the California Natural Diversity Data Base for special-status species that are known to occur in the project survey area; (2) CNPS records for special-status plants; (3) results from recent, relevant surveys and reviews; (4) the NECO Plan; and (5) known habitats in the area (i.e., experience of the consulting biologist). Eagle Crest conducted surveys in 2008 and 2009 for signs of these species in the project area. The results of these surveys are depicted on figures 11 and 12.

Based on the results of these surveys and proposed project activities, we have identified several species that may experience concentrated project effects. These effects could result from anticipated disturbance to areas with special habitat value, high population density, or potential for the project to have concentrated effects on a population. As such, these species are discussed in more detail below.

These species include Nelson's bighorn sheep, burrowing owls, bats, and Couch's spadefoot toad. Two federally listed species are included in the list of special-status species with the potential to be in the project area: Coachella Valley milkvetch and desert tortoise; see section 3.3.4, *Threatened and Endangered Species*, for full discussion of these species.

Nelson's Bighorn Sheep

Nelson's bighorn sheep (also called desert bighorn sheep) are widely distributed from the White Mountains in Mono County to the Chocolate Mountains in Imperial County. They live most of the year close to the desert floor in canyons and rocky areas with ewe and ram populations generally occupying different areas and congregating during mating season. In summer, they move to better forage sites and cooler conditions in the mountains. Migration routes can occur across valleys between mountain ranges or along mountain ridges. For most of the year, ram and ewe populations are geographically

Table 18. Potential for special-status species (Source: Eagle Crest, 2009a).

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Plants					
Abrams's spurge (<i>Chamaesyce abramsiana</i>)	--	--	2	Sandy sites in Mojavean and Sonoran Desert scrubs in eastern California; 0–3,000 feet	Possible along the water pipeline; fall flowering
Arizona spurge (<i>Chamaesyce arizonica</i>)	--	--	2	Sandy flats in Sonoran Desert scrubs, below ~1,000 feet	Possible along the water pipeline; not observed
Ayenia (<i>Ayenia compacta</i>)	--	--	2	Sand and gravelly washes and canyons in desert scrubs, 450–3,600 feet	Possible around the central project area; not observed on 2008 or 2009 surveys
California ditaxis (<i>Ditaxis serrata</i> var. <i>californica</i>)	--	--	3	Sonoran Creosote Bush Scrub from 100 to 3,000 feet	Observed on both linear ROWs
Coachella Valley milkvetch (<i>Astragalus lentiginosus</i> var. <i>coachellae</i>)	E BLM Sensitive	--	1B	Loose to soft sandy soils, often in disturbed sites; 100 to 2,200 feet	Highly unlikely—little to no habitat on project lands and local reported populations appear to have been misidentified; not observed

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Coue's cassia (<i>Senna covesii</i>)	--	--	2	Dry washes and slopes in Sonoran Desert scrubs, 1,000 to 3,500 feet	Possible, especially on the bajadas (compound alluvial fans at the base of mountains) and on/near the central project area; species not observed in 2008, 2009 or on related surveys
Crucifixion thorn (<i>Castela emoryi</i>)	--	--	2	Mojavean and Sonoran Desert scrubs; typically associated with drainages	Observed on the water pipeline
Darlington's blazing star (<i>Mentzelia puberula</i>)	--	--	2	Mojavean and Sonoran Desert scrubs; sandy or rocky soils; 300–4,200 feet	Possible on the water pipeline, in the valley, or central project area
Desert sand-parsley (<i>Ammoselinum giganteum</i>)	--	--	2	Sonoran Desert scrub; known from only one site, near Hayfield Dry Lake, at 1200 feet; last seen in 1922	Highly unlikely; not observed
Desert unicorn plant (<i>Proboscidea altheaefolia</i>)	--	--	4	Sandy areas in Sonoran Desert scrubs throughout southeastern California, below 3,300 feet	Observed near the well sites; possible throughout the valley

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Dwarf germander (<i>Teucrium cubense depressum</i>)	--	--	2	Sandy soils, washes, playa edges, and fields in Sonoran Desert scrubs, below 1,300 feet	Possible on the water pipeline, in the valley; not observed
Flat-seeded spurge (<i>Chamaesyce platysperma</i>)	BLM Sensitive	--	1B	Sandy flats and dunes in Sonoran Desert scrubs; below 350 feet; may be extirpated in California	Possible on the water pipeline, in the valley; not observed
Foxtail cactus (<i>Coryphantha alversonii</i>)	--	--	4	Primarily rocky substrates between 250 and 4,000 feet; Creosote Bush Scrub	Observed on both linear ROWs
Glandular ditaxis (<i>Ditaxis claryana</i>)	--	--	2	Sandy flats in Mojavean and Sonoran Creosote Bush scrubs in Imperial, San Bernardino, and Riverside counties; below 1,500 feet	Possible; not observed
Harwood's eriastrum (<i>Eriastrum harwoodii</i>)	--	--	1B	Range restricted to loose-sandy areas of eastern Riverside and San Bernardino counties	Unlikely due to lack of habitat; not observed
Harwood's milkvetch (<i>Astragalus insularis var. harwoodii</i>)	--	--	2	Dunes, windblown sands, and soft sands below 1,200 feet, east and south of Desert Center	Unlikely, no apparent habitat; not observed

Species	Federal	Status State^a	CNPS^b	Habitat	Likelihood of Occurrence on the Project Site
Jackass clover (<i>Wislizenia refracta</i> var. <i>refracta</i>)	--	--	2	Sandy washes, roadsides, flats; 1,900 to 2,700 feet	Unlikely due to lack of habitat; not observed
Las animas colubrina (<i>Colubrina californica</i>)	--	--	2	Sonoran Creosote Bush Scrub <3,300 feet	Possible on/near the central project area; not observed in 2008, 2009 or on related surveys
Mesquite neststraw (<i>Stylocline sonorensis</i>)	--	--	1A	Open sandy drainages; known from one site near Hayfield Spring; not seen since 1930 and presumed extinct in California	Highly unlikely; not observed
Orocopia sage (<i>Saliva greatae</i>)	BLM Sensitive	--	1B	Mojavean and Sonoran Desert scrubs; gravelly/rocky bajadas, mostly near washes; below 3,000 feet; only known west of the Project	Unlikely but possible near/on the central project area; reported south of the central project area in earlier surveys but not observed in 2008 and 2009 on the linear ROWs

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Parish's club cholla (<i>Grusonia parishii</i>)	--	--	2	Flowering late spring to early summer (May to July); Mojave and Sonoran deserts, silty, sandy, or gravelly flats, dunelets, hills; 950–3,000 feet	Possible habitat near/on the central project area
Sand evening primrose (<i>Camissonia arenaria</i>)	--	--	2	Sandy washes, rocky slopes, Sonoran desert scrubs; below 1,500 (3,500) feet	Possible; not observed
Slender woolly-heads (<i>Nemacaulis denudate</i> var. <i>gracilis</i>)	--	--	2	Dunes in coastal and Sonoran Desert scrubs, primarily in the Coachella Valley; below 1,500 feet	No habitat; not observed
Spearleaf (<i>Matelea parvifolia</i>)	--	--	2	Rocky ledges and slopes, 1,000 to 6,000 feet, in Mojave and Sonoran Desert scrubs	Possible habitat near/on the central project area
Spiny abrojo (<i>Condalia globosa</i> var. <i>pubescens</i>)	--	--	4	Sonoran Creosote Bush Scrub; 500 to 3,300 feet	Possible on/near the central project area; not observed in 2008 or 2009 surveys
Wiggins' cholla (<i>Opuntia wigginsii</i>)	--	--	3	Eastern Riverside County, under about 3,000 feet	Observed in 2009 surveys

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Invertebrates					
Cheeseweed owlfly (<i>Oliarces clara</i>)	--	--	--	Creosote bush scrub in rocky areas	Possible, especially near the central project area
Amphibians					
Couch's spadefoot (<i>Scaphiopus couchii</i>)	BLM Sensitive	SSC	--	Various arid communities in extreme southeastern California and east, south	Possible on entire project area; no artificial impoundments
Reptiles					
Chuckwalla (<i>Sauromalus ater</i>)	--	--	--	Rock outcrops in Mojave and Sonoran Desert scrubs	Observed; also likely on/near the central project area
Desert rosy boa (<i>Charina trivirgata gracia</i>)	BLM Sensitive	--	--	Rocky uplands and canyons; often near stream courses	Possible, especially near the central project area
Mojave fringe-toed lizard (<i>Uma scoparia</i>)	BLM Sensitive	SSC	--	Restricted to aeolian sandy habitats in the Mojave and northern Sonoran deserts	Does not occur on project area due to lack of habitat
Desert tortoise (<i>Gopherus agassizii</i>)	T	T	--	Most desert habitats below about 5,000 feet in elevation	Observed on both linear ROWs in 2008 and 2009; likely on central project area

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Birds					
American peregrine falcon (<i>Falco peregrinus anatum</i>)	Delisted BCC	E Fully Protected	--	Dry, open country, including arid woodlands; nests in cliffs	Possible forager onsite, may nest in adjacent mountains; not observed
Bendire's thrasher (<i>Toxostoma bendirei</i>)	BCC BLM Sensitive	SSC	ABC:WLBCC	Arid to semi-arid brushy habitats, usually with yuccas, cholla, and trees	Possible; not observed
Burrowing owl (<i>Athene cunicularia</i>)	BCC BLM Sensitive	SSC	--	Open, arid habitats	Observed on linear ROWs; possible on central project area
Crissal thrasher (<i>Toxostoma crissale</i>)	BCC	SSC	--	Dense mesquite and willows along desert streams and washes	Unlikely, but possible on central project area only; no habitat on linear ROWs and not observed
Ferruginous hawk (<i>Buteo regalis</i>)	BCC BLM Sensitive	WL	--	Arid, open country	Possible winter resident only
Gila woodpecker (<i>Melanerpes uropygialis</i>)	BCC	E	--	Desert woodland habitats	Possible; not observed

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Golden eagle (<i>Aquila chrysaetos</i>)	BCC BLM Sensitive	WL Fully Protected	--	Open country; nests in large trees in open areas or cliffs	Possible forager on site, may nest in adjacent mountains; observed in 2008.
LeConte's thrasher (<i>Toxostoma lecontei</i>)	--	SSC	--	Desert with scattered shrubs and sandy and/or alkaline soil	Possible; not observed
Loggerhead shrike (<i>Lanius ludovicianus</i>)	BCC	SSC	--	Arid habitats with perches	Common; observed
Mountain plover (<i>Charadrius montanus</i>)	BCC BLM Sensitive	SSC	ABC:WLBCC	Dry upland habitats, plains, bare fields	Unlikely, but possible winter visitor to agricultural fields in the project area
Northern Harrier (<i>Circus cyaneus</i>)	--	SSC	--	Open habitats; nests in shrubby pen land and marshes	Possible; not observed
Prairie Falcon (<i>Falco mexicanus</i>)	BCC	WL	--	Dry, open country, including arid woodlands; nests in cliffs	Likely forager on site, may nest in adjacent mountains; not observed
Short-eared owl (<i>Asio flammeus</i>)	--	SSC	ABC:WLBCC	Open habitats: marshes, fields; nests on ground and roosts on ground and low poles	Possible winter visitor

Species	Federal	Status State^a	CNPS^b	Habitat	Likelihood of Occurrence on the Project Site
Sonoran yellow warbler (<i>Dendroica petechia sonorana</i>)	BCC	SSC	--	Riparian habitats, woodlands, orchards	Possible—no habitat on linear ROWs and habitat on the central project area is unknown; observed at the Eagle Mountain town site reservoir on previous survey; not observed during 2008 and 2009 surveys
Vermilion flycatcher (<i>Pyrocephalus rubinus</i>)	--	SSC	--	Wooded and shrubby sites near water, especially with willows, mesquite and cottonwoods	Highly unlikely except as transient—no habitat on linear ROWs and unlikely to be habitat on the central project area; not observed

Species	Federal	Status State ^a	CNPS ^b	Habitat	Likelihood of Occurrence on the Project Site
Yellow-breasted chat (<i>Icteria virens</i>)	--	SSC	--	Dense streamside thickets, willows; brushy hillsides and canyons	Highly unlikely except as transient—no habitat on linear ROWs and unlikely to be habitat on the central project area; transients observed in area on two previous surveys, but not observed during 2008 and 2009 surveys
Mammals					
American badger (<i>Taxidea taxus</i>)	--	SSC	--	Many habitats	Observed in 2008 and 2009
Big free-tailed bat (<i>Nyctinomops macrotis</i>)	--	SSC	WBWG:MH	Cliffs and rugged rocky habitats in arid, country, also riparian woodlands	Possible forager on site, especially near mountains
Burro deer (<i>Odocoileus hemionus eremicus</i>)	--	Game species	--	Arboreal and densely vegetated drainages	Observed
California leaf-nosed bat (<i>Macrotus californicus</i>)	BLM Sensitive	SSC	WBWG:H	Lowland desert associate, found in caves, mines, tunnels and old buildings	Known from Eagle Mountain mine so possible near or on the central project area

Species	Federal	Status State^a	CNPS^b	Habitat	Likelihood of Occurrence on the Project Site
Colorado valley woodrat (<i>Neotoma albigula venusta</i>)	--	--	--	Under mesquite in creosote bush scrub; southeastern California	Possible
Nelson's bighorn sheep (<i>Ovis canadensis nelsoni</i>)	BLM Sensitive	Game species (not hunted in project area)	--	In mountains and adjacent valleys in desert Scrub	Likely near the central project area; detected on previous surveys
Pallid bat (<i>Antrozous pallidus</i>)	BLM Sensitive	SSC	WBWG:H	Several desert habitats	Possible, primarily near the central project area; detected on previous surveys
Pocketed free-tailed bat (<i>Nyctinomops femorosaccus</i>)	--	SSC	WBWG:M	Variety of arid areas in pinyon-juniper woodland, desert scrubs, palm oases, drainages; always near rocky areas	Possible near the central project area
Spotted Bat (<i>Euderma maculatum</i>)	BLM Sensitive	SSC	WBWG:H	Arid scrub and grasslands, to coniferous forests, roosts in cliffs, forages along streams and in woodlands, fields	Possible near the central project area

Species	Federal	Status State^a	CNPS^b	Habitat	Likelihood of Occurrence on the Project Site
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	BLM Sensitive	SSC	WBWG:H	Broad habitat associations. Roosts in caves and manmade structures; feeds in trees	Possible, primarily near the central project area and transmission line; detected on previous surveys
Western mastiff bat (<i>Eumops perotis californicus</i>)	BLM Sensitive	SSC	WBWG:H	Cliffs, trees, tunnels, buildings in desert scrub	Highly likely near/on the central project area; detected on previous surveys

^a Source: California DFG, 2010, 2009

Applicable Status codes are as follows:

E – Endangered

T – Threatened

Federal C – Candidate species for listing

Federal SC – Species of Special Concern (species whose conservation status may be of concern to FWS, but have no official status [formerly C2 species])

Federal BCC – FWS Bird of Conservation Concern

State SSC – California DFG Species of Special Concern (species that appear to be vulnerable to extinction)

State Protected – Species that cannot be taken without a permit from California DFG

State Fully Protected – Species that cannot be taken without authorization from the Fish and Game Commission

State WL – Watchlist species: species that are not SSC, state-listed, or fully protected (Note: State WL species have not been included in this table if they have no other protection designation.)

BLM Sensitive – Species under review, rare, with limited geographic range or habitat associations, or declining. BLM policy is to provide the same level of protection as FWS candidate species

^b CNPS: List 1A – Plants presumed extinct in California

List 1B – Plants rare and endangered in California and elsewhere

List 2 – Plants rare and endangered in California but more common elsewhere

List 3 – Plants about which CNPS needs more information

List 4 – Plants of limited distribution

(Note: CNPS lists 1 and 2 require CEQA consideration.)

ABC:WLBC – American Bird Conservancy United States Watchlist of Birds of Conservation Concern

WBWG – Western Bat Working Group (<http://wbwg.org>):

H – High Priority – These species should be considered the highest priority for funding, planning, and conservation actions.

M – Medium Priority – These species warrant closer evaluation, more research, and conservation actions of both the species and the threats

L- Low Priority – Most of the existing data support stable populations of the species and that the potential for major changes in status is unlikely.

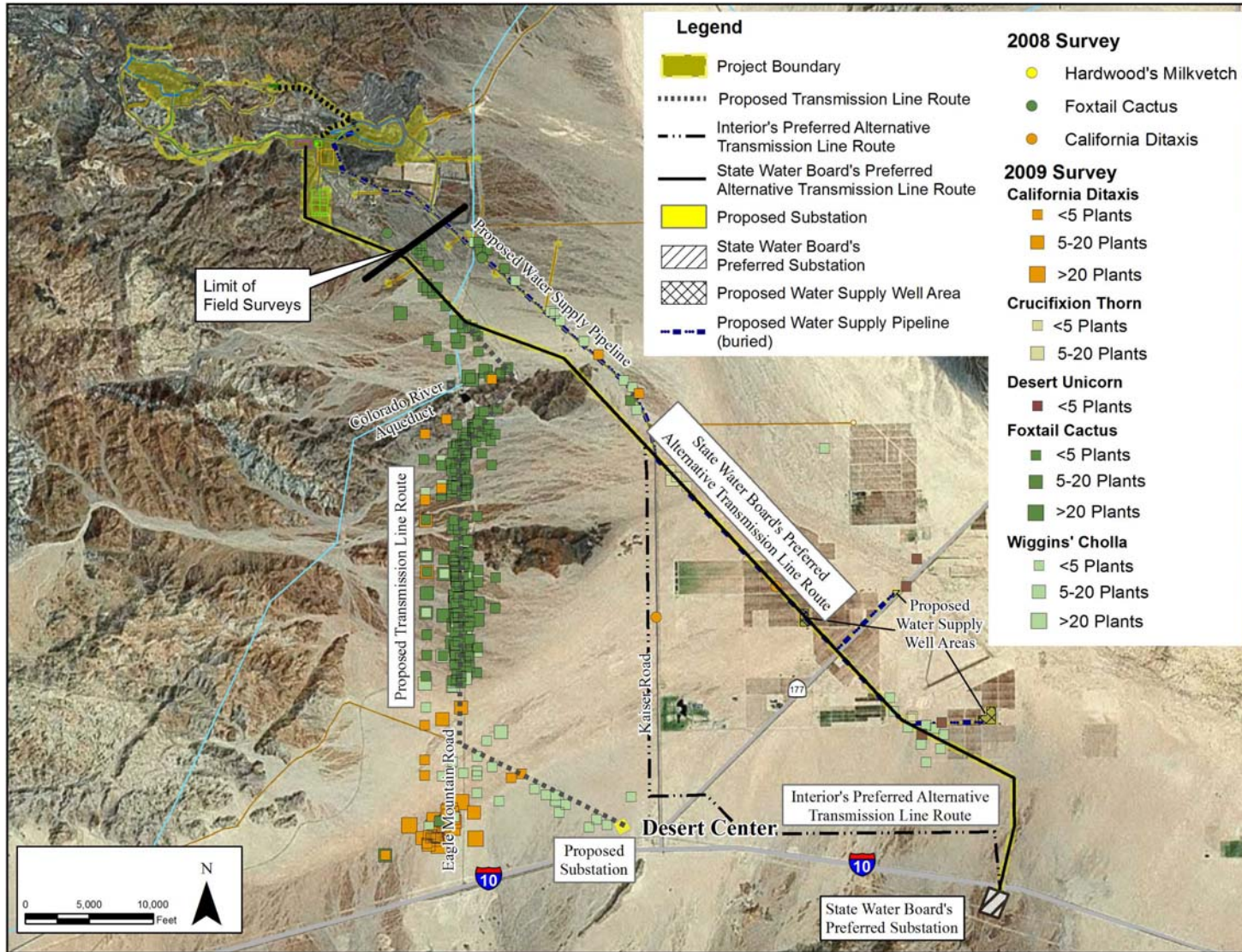


Figure 11. Results of special-status plant surveys (Source: State Water Board, 2010, and ESRI, 2010, as modified by staff).

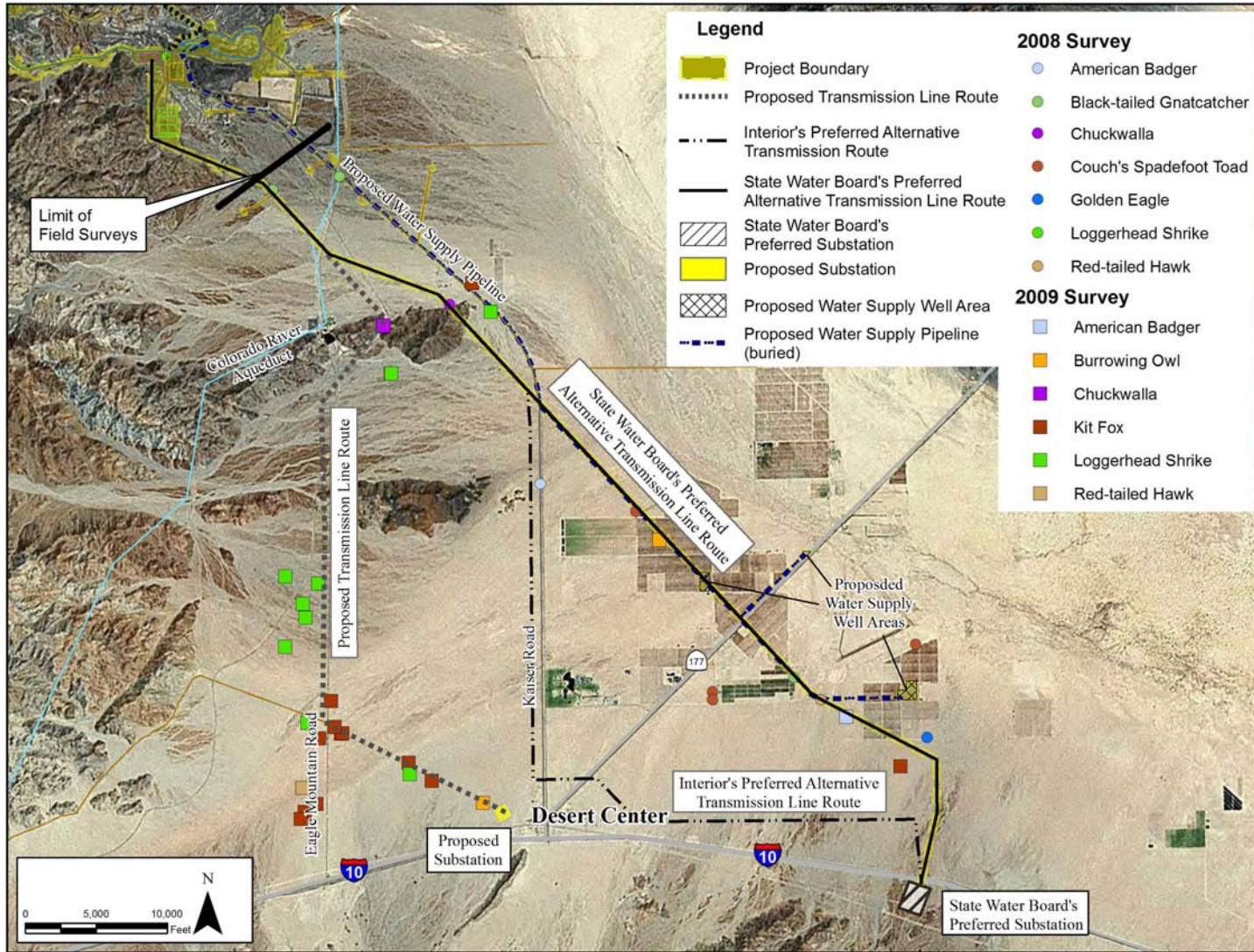


Figure 12. Results of special-status wildlife surveys (Source: State Water Board, 2010, and ESRI, 2010, as modified by staff).

separated with rams being more dispersed and ewes more congregated. During the breeding season, or rut, rams travel to ewe populations, generally between August and November. The lambing season is from January to June with the majority of births occurring in February and April (Bighorn Institute, 2011).

The BLM management plan for this species identifies eight metapopulations, two of which are included in the NECO Planning Area: the Southern Mojave and Sonoran metapopulations. These metapopulations are further divided into demes, or populations. The project is located in the Southern Mojave Metapopulation, adjacent to the Eagle Mountain population and near the Coxcomb population. The central project area is located in BLM's Joshua Tree National Park Desert Bighorn Sheep Wildlife Habitat Management Area. Other populations in the project vicinity include the Little San Bernardino Mountain population, located north of Interstate 10 west of the project, and the Chocolate, Orocopa, and Chuckwalla Mountain populations south of Interstate 10.

The movement of individuals between these populations contributes to gene flow and promotes genetic diversity of the metapopulation. The construction of barriers between these populations, including Interstate 10 and the Metropolitan Water District's canal reduce this gene flow and could reduce fitness for populations that are isolated from the metapopulation (Epps et al., 2005).

Researchers conducted a 2-year radio telemetry study of the Eagle Mountain bighorn sheep population (Divine and Douglas, 1996). This report provides maps showing locations of ewes and rams for the entire study period with locations mapped by season. Based on radio telemetry, Divine and Douglas (1996) identified two distinct ewe populations in the Eagle Mountains: one near the central project area and one to the southwest, about 15 miles from the central project area. During the study, these populations did not mix; and rams generally occupied the area between the two ewe populations.

Throughout the year, the northern ewe population moved between Eagle Tank Spring, located northwest of the central project area, and Buzzard Spring, located south of the central project area. The Park Service identified Buzzard Spring as an important water source for sheep moving between the Coxcomb and Little San Bernardino Mountains. Maps of ewe locations during winter, spring, and summer show ewes dispersed across this area, with general congregations near Eagle Tank Spring in spring and near Buzzard Spring in summer. Winter locations, which were more dispersed though the majority of winter locations, were near Eagle Tank Spring (Divine and Douglas, 1996). The report does not provide data for the fall. In winter, ram locations were generally concentrated near Buzzard Spring but ranged from north of the central project area to the southern ewe population. In spring and summer, rams were increasingly concentrated near Buzzard Spring. Divine and Douglas state that sheep were seen crossing the haul road and appear to use the ridges leading from the extreme northern ridges to the haul road as crossing zones across the central project area. Sheep also use the northwestern section of the mine, as well as the area west of Placer Canyon to travel between the two water sources (figure 13).

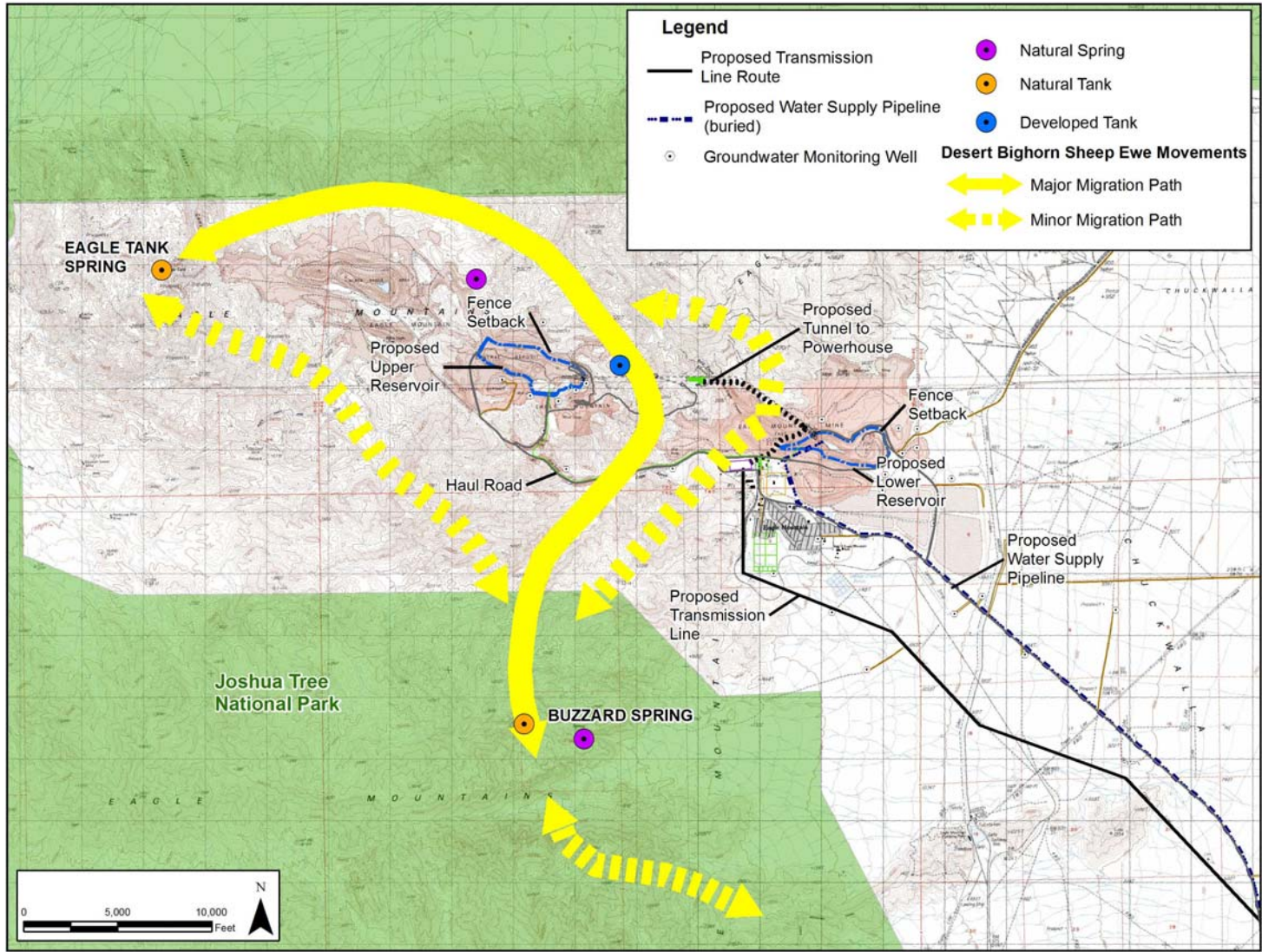


Figure 13. Desert bighorn sheep ewe migratory routes in the central project area (Source: Commission staff interpretation of telemetry results in Divine and Douglas [1996]).

Divine and Douglas (1996) also observed that bighorn sheep in the Eagle Mountains were somewhat tolerant of human activity. A U.S. Department of Agriculture, Forest Service (Forest Service) mining engineer reported bighorn sheep watering within 180 feet of an Eagle Mountain mine office building. Other reports include bighorn sightings along roads that were constantly used by large industrial mining trucks. The researchers conclude that bighorn can tolerate some disturbance, especially if the disturbance is ongoing and not directed at the sheep. However, they do not conclude that such disturbance would necessarily have a null effect or that sheep would inevitably become accustomed to human activity.

In the past, water access for bighorn sheep in the project area has been provided at the southern Eagle Mountain water tank, a developed system about 0.5 mile west of the proposed upper reservoir, a natural spring about 0.6 mile north-northwest of the upper reservoir, and in the mine pits where water collects following rains (TR-4). Potential for water runoff pooling in the mine pits is present in existing conditions; however, the status of the other water sources is unknown. Results of Divine and Douglas (1996) indicate presence of bighorn sheep around both the Eagle Mountain water tank and the natural spring and between the proposed reservoir locations. Additionally, surveys conducted in 1995 for the Eagle Mountain landfill observed bighorn scat in the central project area.

Burrowing Owl

The burrowing owl is a BLM sensitive species that occurs in open arid areas. The owls generally occur in colonies and build nests in burrows, which are an essential component of burrowing owl habitat: both natural and artificial burrows provide protection, shelter, and nests for the owls. The burrows are typically constructed by other burrowing animals including kit fox, badger, and ground squirrel, but the owls also use human-made structures, such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement (California Burrowing Owl Consortium, 1993).

Eagle Crest conducted Phase I habitat surveys (2008) and Phase II presence/absence surveys (2009). During the Phase II survey, biologists located two owl burrows—one active and one inactive. One burrow is located on the proposed water pipeline ROW, the other is on the proposed transmission line ROW near the southern terminus.

Golden Eagle and Other Raptors

Several special-status raptor species, including golden eagle and prairie falcon, have the potential to occur in the central project area. Golden eagles nest in large trees in open cliff areas. Prairie falcon nest on vertical cliff faces. Foraging habitat for both species includes open areas where small and mid-sized animals are present. Nesting season for golden eagles in the southern part of their range (including the project area) can begin as early as late January and last through August (California Wildlife Habitats Relationship System, 2010a). Nesting season for the prairie falcon lasts from mid-

February through mid-September with peak season from April to early August (California Wildlife Habitats Relationship System, 2010b).

As part of its July 7, 2010, filing (Eagle Crest, 2010a), Eagle Crest provided results from golden eagle surveys that took place in March and April 2010. The surveys covered mountainous areas within 10 miles of the proposed project. The surveyors located a total of 34 golden eagle nest sites distributed among nine active and five inactive eagle territories in the project region. Four of the territories identified overlap the Eagle Mountain Project area. Surveyors recorded one incubating golden eagle female within the nine active territories. Other raptor species encountered during the surveys include the American kestrel, barn owl, Cooper's hawk, great horned owl, long-eared owl, northern harrier, osprey, peregrine falcon, prairie falcon, red-tailed hawk and Swainson's hawk.

Bats

Several BLM sensitive bat species are known to occur in the project area. These species include big free-tailed bat, California leaf-nosed bat, pallid bat, pocketed free-tailed bat, spotted bat, Townsend's big-eared bat, and Western mastiff bat. These species all prefer roosting areas associated with caves, cliffs, or rocky outcrop habitat, which is present in the central project area. Foraging habitat for these species exists in desert scrub and desert riparian areas within the project area.

Surveys conducted in the central project area in June and December of 1991, in preparation for the Eagle Mountain Landfill EIS, found the presence of Townsend's big-eared bat, California leaf-nosed bat, and pallid bat in the central project area. Based on their results, the surveyors concluded that California leaf-nosed bats use an adit at the Eagle Mountain mine as a winter roost area and determined this is the main winter roosting area for this species in the Eagle Mountains. About 100 bats were observed exiting the adit. California leaf-nosed bats were also observed near the mill site at the mine.

Couch's Spadefoot Toad

Couch's spadefoot toads spend their lives in proximity to ephemeral pools in the southern California desert. During dry periods the adults live buried under the surface. It is possible for the toads to survive these dry conditions for multiple years without emerging from their burrows. Following spring and summer rains, the toads emerge to feed and breed in the inundated pools. In portions of the project area where access was permitted, Eagle Crest conducted surveys for all ephemeral impoundments with the potential to support this species. No surveys were conducted in the central project area.

3.3.3.2 Environmental Effects

In its draft EIR for the Eagle Mountain Project, the State Water Board identified its preferred alternative substation location and transmission line route as the

environmentally superior interconnection alternative for the project. The State Water Board's preferred alternative transmission line would interconnect with the electrical grid at the proposed Red Bluff substation (figure 2). SCE proposes to construct, own, and operate this substation as a component of the Desert Sunlight Solar Farm Project. SCE filed an application with the California Public Utilities Commission for a permit to construct the substation in November 2010 and expects the substation to be operational by 2013. The SCE-proposed substation is located immediately south of Interstate 10 and about 6 miles east of the applicant's proposed substation. The State Water Board's preferred alternative transmission line route would diverge from the applicant's proposed transmission line route after crossing the Colorado River Aqueduct. It would then run parallel to and on the northwest side of the existing 160-kV SCE transmission line route for about 10.5 miles going southeast to a point just north of the proposed substation, then it would travel south about 2 miles to the substation. In total, this alternative route would be 16.4 miles long.

In comments filed on the draft EIS (February 28, 2011), Interior clarified that its preferred alternative transmission line route is along Kaiser Road. This alternative route would follow the State Water Board's preferred alternative transmission line route to Kaiser Road, turn south and parallel Kaiser Road for about 5.2 miles, and then turn east and travel about 0.9 mile, crossing over State Route 177. From here, this transmission line route would travel southeast for 0.8 mile and east for 3.7 mile, then turn south about 2 miles to the substation. In total, this alternative route would be 18.6 miles long. In the discussion below, we compare the effects of the State Water Board's and Interior's preferred alternative transmission line routes with the applicant's proposed route. The different transmission routes are depicted in figure 9 and other figures.

Our discussion of environmental effects presented below is based on information provided in the final license application (Eagle Crest, 2009a), additional information filed by Eagle Crest (Eagle Crest, 2009b, 2009c), Eagle Crest's response to comments on the final license application (Eagle Crest, 2009e), and Eagle Crest's supplemental information filed on July 7, 2010 (Eagle Crest, 2010a). Our discussion of effects specific to construction and operation of the transmission line is based on the results of Eagle Crest's 2008, 2009, and 2010 surveys and information provided in the State Water Board's draft EIR (State Water Board, 2010).

Effects of Construction on Vegetation

Construction of the project would permanently disturb lands within the footprint of project facilities including the Eagle Mountain switchyard, desalination area, administration buildings, access roads, transmission line support structures, reservoirs, and water supply pipeline.

In response to the Commission's AIR, Eagle Crest filed its WEAP on October 27, 2009. The WEAP includes the training of designated staff biological monitors that would be onsite during construction. The monitors would have the authority to halt construction

activities if they determine sensitive resources are at risk. These monitors would be responsible for clearing and designating safe work areas, flagging sensitive areas, and monitoring exclusion fencing. Construction crews would be instructed to only work in areas approved by the biological monitors. Desert animals frequently take refuge in shaded areas associated with parked vehicles. As such, the biological monitors would also be responsible for inspecting and clearing these areas prior to vehicle movement.

During construction in native habitats, Eagle Crest proposes to restrict surface disturbance to the smallest area necessary to complete the construction (Measure BIO-5). Eagle Crest would design new spur roads and improvements to existing roads in a way that would preserve existing desert wash topography and flow patterns.

In addition to the measures described above, Eagle Crest also proposes several measures specifically designed to reduce effects of project construction on local vegetation, including the revegetation of all temporarily disturbed areas. In response to the Commission's AIR, Eagle Crest filed its Revegetation Plan on October 27, 2009 (Measure BIO-8). The plan includes developing a quantitative description of the existing vegetation community, so revegetation success can be measured. To increase potential for successful revegetation in the desert environment, Eagle Crest would retain topsoil removed during site clearing and return the soil to the site prior to planting. Eagle Crest's plan also includes micro-site preparation and grading. This preparation would include vertical mulching and other techniques to increase germination potential and plant growth. Eagle Crest's planned restoration techniques include (1) seeding and/or planting seedlings of colonizing species and (2) developing a soil micro-community by inoculating mycorrhizal fungi and planting species that develop a mycorrhizal net. Following planting, Eagle Crest would implement weed control and initial irrigation. Eagle Crest's Revegetation Plan also includes a schedule for the expected regrowth of native species and remedial measures to be implemented if needed.

In its comments on the draft EIS, the Park Service states that it has had success with revegetation and recommends irrigating transplants for 2 years. The Park Service states that low annual rainfall in this region requires the plants be maintained monthly for 2 years.

As compared to the proposed route, the State Water Board's preferred alternative transmission line route would increase the length of the transmission line by 2.9 miles. The State Water Board's preferred route would cross 205.6 acres of Sonoran Creosote Bush Scrub; 97.6 acres of Desert Dry Wash Woodland; and 97.3 acres of developed land. Interior's preferred alternative transmission route would increase the length of the transmission line by 5.1 miles and would cross 177.0 acres of Sonoran Creosote Bush Scrub; 258.9 acres of Desert Dry Wash Woodland; and 18.1 acres of developed land.

Our Analysis

Construction of the project would have unavoidable effects on local vegetation. Based on habitat mapping and current project design, we estimate activities associated

with the central project area and water supply pipeline would affect 65.6 acres of Sonoran Creosote Bush Scrub and 15.4 acres of Desert Dry Wash Woodland. These areas of effect would be the same for the proposed project and the State Water Board's and Interior's preferred alternative transmission line routes. Additional disturbance would occur at transmission line support structures, lay down and staging areas, transmission line pull sites and substation.⁵³ Specific effects of the pulling sites and laydown areas are not known because Eagle Crest would determine the exact location of these areas during final engineering design. This design stage would occur during the first 2 years of the license. However, Eagle Crest intends to locate these areas within previously disturbed areas whenever possible. For disturbance associated with these transmission facilities, the proposed project would affect about 46.0 acres of Sonoran Creosote Bush Scrub, 15.4 acres of Desert Dry Wash Woodland, and 2.8 acres of disturbed areas. The State Water Board's preferred alternative transmission line route would affect about 17.5 acres of Sonoran Creosote Bush Scrub, 11.0 acres of Desert Dry Wash Woodland, and 3.6 acres of disturbed areas. Interior's preferred alternative transmission line route would affect about 23.0 acres of Sonoran Creosote Bush Scrub, 13.4 acres of Desert Dry Wash Woodland, and 9.9 acres of disturbed areas. These activities have the potential to remove or disturb existing vegetation and alter soil characteristics through compaction, subsidence, erosion, changes in drainage patterns, or disturbance to soil crusts.

While some of these effects are temporary, such as disturbance within lay down and storage areas and pull sites, the desert environment in which they occur is very slow to regenerate. Clearing of native vegetation in lay down areas, transmission line pulling sites, transmission line support tower footprints, waste spoil and salt disposal sites, brine ponds, and water pipeline would be a necessary component of constructing project facilities.

The State Water Board's preferred alternative transmission line route would require less new ROW development and cross a fewer acres of Dry Desert Woodland than either the proposed route or Interior's preferred alternative route. The State Water Board's preferred alternative transmission line ROW would still cross creosote bush scrub; however, unlike the proposed alternative and Interior's preferred alternative transmission route, these lands generally would be outside the Desert Wildlife Management Area (DWMA) and desert tortoise critical habitat. Additionally, the State Water Board's alternative would use a greater percentage of disturbed lands. Therefore, when compared to the proposed project and the Interior's preferred alternative transmission route, the State Water Board's alternative would have less effect on vegetation resources.

⁵³ Only the proposed transmission line would require a new substation be built specifically as part of the proposed project; the State Water Board's and Interior's preferred transmission lines would connect at the planned Red Bluff substation.

Implementation of Eagle Crest's proposed WEAP would ensure the potential for inadvertent effects on sensitive species is reduced. Keeping state and federal resource management agencies apprised of construction activities and implementation of mitigation measures would provide the agencies oversight of these activities and ensure effects are minimized and mitigation is effective. Careful planning and design of construction areas and access roads to reduce the extent of disturbance in native habitats and maintain existing drainage patterns is also a necessary component of limiting project effects in these areas.

Eagle Crest's proposed measures would limit effects of construction on vegetation through revegetation plantings and control of invasive species. Yet, compared to non-desert areas, the duration of these effects would be much longer, with regeneration to existing conditions likely requiring several decades. However, these effects would be highly localized within the project footprint and would have minimal effect on areas immediately adjacent to the disturbance areas. The overall area of disturbance would also be small compared to the large extent of similar vegetation structure in the surrounding area and the project is not expected to cause any population level effects on vegetation species. This is true for all transmission line routes analyzed.

Eagle Crest's Revegetation Plan includes a variety of measures that would promote successful revegetation in a desert ecosystem. However, the plan does not include a stipulation that any straw, hay, or topsoil brought to the site be certified weed free. These materials may be used to prevent erosion and prepare planting sites. The use of weed-free materials brought to the site would reduce the potential for introducing invasive species into the project. We also concur with the Park Service and find that monthly irrigation of transplants for 2 years would increase likelihood of transplant survival. If Eagle Crest were to revise the proposed Revegetation Plan to include the use of weed-free materials and continued irrigation of transplants, the potential for revegetation success would increase.

Effects of Operation on Vegetation

Operation of the project would include the addition of water to the project reservoirs, proposed generating operations, and maintenance of project facilities. These activities could affect vegetation by providing water subsidies or disturbing new lands as required for maintenance.

In its comments filed on the draft EIS, the Park Service notes that if riparian vegetation develops around the project reservoirs, it could create an ecological trap⁵⁴ for wildlife, potentially including threatened and endangered species. To reduce potential effects of project operations on vegetation, Eagle Crest's WEAP requires that all maintenance activities potentially requiring ground disturbance occur in the presence of

⁵⁴ The term ecological trap refers to wildlife species selecting poor quality habitat based on certain environmental cues created by human manipulation of the environment.

biological monitors. Additionally, in 2006 Eagle Crest entered into a Memorandum of Understanding (MOU) with FWS, BLM, and Forest Service that provides guidelines for vegetation maintenance along transmission line ROWs on federal lands. This MOU also includes standards for revegetation practices in these areas.

Our Analysis

Following construction, we expect operation of the transmission line and water pipelines would have little, if any, effect on vegetation. If any leaks are present in the pipeline, desert annuals are likely to colonize the localized areas.

Specific soil conditions at the elevation of the normal high water line around both reservoirs are unknown since Eagle Crest was not given access to conduct surveys in these areas. However, past mining activities have removed any topsoil, and we expect current materials in these areas to have high mineral content and very low nutrient availability. Such areas typically require many decades to develop cryptobiotic crusts. Under these conditions, we expect vegetation establishment to occur very slowly.

Operation of the project reservoirs would add water to areas currently void of vegetation. It is possible that vegetation would colonize these wetted areas, although any community development would be limited to the area near the normal high water line at each reservoir. Steep topography along the sides of the proposed reservoirs would limit the area of water availability to a narrow band around each reservoir. Other areas of the reservoir would be available for seed colonization during drawdown periods; however, these areas would then be inundated, normally on daily basis, as each reservoir is refilled during project operations. Proposed operations would involve daily water level fluctuations in both reservoirs of about 100 feet. Such frequent wetting and drying would greatly reduce the potential for any vegetation establishment below the high water lines.

Desert riparian tree species, including cottonwood and willows, are adapted to these sorts of environments. These species typically colonize bare mineral sand bars deposited during the decline of spring flood pulses in desert streams (Stromberg, 1993). It is possible the wetted areas adjacent to the reservoir high water line would mimic these conditions. Seeds from these species are wind dispersed and have limited viability; they do not persist in the soil from one year to the next. To establish, the seeds need to land on wetted mineral soil, germinate, and develop sufficient root structure to maintain access to groundwater after water levels recede. If the water recedes too quickly, the seedlings will die (Stromberg, 1993). It is difficult to speculate how these species would respond to the daily wetting and drying along the sides of the proposed reservoirs. Over the course of the license, some limited establishment of these species should be expected.

Creation of the project reservoirs could create an ecological trap for migratory birds and other wildlife. For example, wildlife may select nesting habitat based on the presence and structure of vegetation. In the past, these cues indicate a source of local water and associated aquatic insect communities that would provide a suitable food source. However, in the case of the proposed project, Eagle Crest proposes to implement

measures to maintain water quality using reverse osmosis membranes. This process would also limit productivity in the reservoirs by removing algae and microbial life forms that could provide a food base for aquatic insects. Therefore, in theory, there is potential for riparian vegetation to attract wildlife to low quality habitat associated with the project reservoirs.

While we are not certain vegetation would develop due to frequent wetting and drying of soils, poor soil development, and reservoir liners, there is potential for vegetation establishment. Such establishment of trees and shrubs could result in damage to the reservoir liners, increased seepage from the reservoirs, and loss of water through evapotranspiration. In addition, there may be potential, probably limited, for such vegetation to attract wildlife to an otherwise infertile location, possibly creating an ecologic trap for birds and other wildlife as suggested by the Park Service. Preventing the development of substantial riparian vegetation, including trees and shrubs, would help prevent this possible attraction of wildlife, damage to the project liners, and water loss.

Effects of Construction on Noxious and Invasive Species

Construction of the project would remove existing vegetation and disturb soils, creating conditions suitable for the establishment of noxious or invasive plants. Once the species establish, they compete with native species for resources, which are limited in the desert environment. Proliferation of these invasive species has the potential to alter the existing landscape structure and wildlife habitat.

To prevent the establishment of noxious and invasive species, Eagle Crest proposes to implement its Invasive Species Monitoring and Control Plan (Measure BIO-9). In response to the Commission's AIR, Eagle Crest filed its plan on October 27, 2009. The plan includes pre-construction surveys to determine baseline conditions, followed with construction and post-construction surveys (to continue for 2 years post-construction) to identify any new populations of invasive species. If these surveys identify increases in weed species presence and/or frequency, Eagle Crest would implement control measures. Eagle Crest's proposed control measures include manual and mechanical removal and application of EPA-certified herbicides.

In their comments on the draft EIS, FWS, BLM, and the Park Service state that the current Invasive Species Monitoring and Control Plan, which calls for surveys for 2 years post construction is inadequate. FWS recommends amending the Invasive Species Monitoring and Control Plan to include a minimum of 5 years of surveys with minimum precipitation requirements for an accurate assessment and an adaptive management plan, including success criteria and contingencies in the event success criteria are not met.

Our Analysis

Construction activities would create areas suitable for establishment of invasive weeds by removing existing vegetation and disturbing soil. These effects would be increased along the State Water Board's preferred alternative transmission line route

because of the greater levels of soil disturbance associated with the additional length of the line. Eagle Crest's proposed plan to monitor and control invasive species is scientifically sound and would decrease the potential for weed proliferation in areas disturbed during construction. The proposed plan would be equally applicable to all transmission line routes analyzed. The Invasive Species Monitoring and Control Plan identifies baseline conditions and biological triggers, indicating the need for implementation of control measures. However, the plan does not include criteria for determining success or adaptive management. If Eagle Crest amended the proposed Invasive Species Monitoring and Control Plan to include criteria for success and the development of environmental measures to be implemented if initial efforts do not prove successful, such as extended treatment periods or more frequent treatments, effects of noxious and invasive weeds could be further reduced.

Effects of Operation on Noxious and Invasive Species

Operation of the project would include the addition of water to the project reservoirs, as well as operation and maintenance of project facilities. These activities could affect noxious and invasive weeds by providing water subsidies or disturbing new lands during maintenance. These conditions could create colonization potential for invasive species.

Eagle Crest's Invasive Species Monitoring and Control Plan calls for surveying for invasive species up to 2 years following project construction. No surveys are proposed for the remainder of the license.

Our Analysis

Eagle Crest's Invasive Species Monitoring and Control Plan appropriately concentrates transects in areas where soil disturbance is expected during construction; however, there is no mention of surveys near potential water subsidies associated with the project. These water subsidies could occur at well sites or in areas within and adjacent to the project reservoirs.

The addition of water to desert soils, even in small amounts associated with leaks or seepage at well sites, would create microsites with greater vegetation growth than the surrounding areas. These microsites would provide ideal conditions for colonization by invasive species. Addition of water to the project reservoirs would also provide wetted soil conditions favorable for some plants. As discussed above, we expect low levels of available nitrogen, resulting from mining activities, to inhibit vegetation colonization around the project reservoirs. These conditions would also inhibit colonization of most invasive species known to occur in the project area. However, tamarisk has germination requirements similar to cottonwood and willow (Stromberg, 1993) and could colonize the perimeter of project reservoirs. Implementation of Eagle Crest's Invasive Species Monitoring and Control Plan would not address these issues.

In particular, the plan does not address the potential for weeds to colonize the reservoir areas where water availability would increase. Water subsidies related to project operations would occur at any seepage areas associated with the proposed reservoirs and well sites. If Eagle Crest modified its proposed Invasive Species Monitoring and Control Plan to include the identification and monitoring of these areas, the potential for increased weed proliferation would be reduced.

Additionally, the project reservoirs would continue to be a potential water source for invasive plants for the duration of the license. If soil conditions surrounding the high water line become suitable for vegetation establishment, noxious and invasive weeds are likely to be a component of the new vegetation growth. For reasons discussed above, we expect vegetation would be slow to establish in these areas. As such annual surveys for invasive and noxious weeds are not necessary. However, if Eagle Crest amended the proposed plan to include annual surveys around the project reservoirs, seepage areas, and any additional areas where the project creates frequent disturbance or wetting of soils, commencing once vegetation establishment is observed, the potential for weed proliferation would be further reduced. In addition, we concur with Interior that temporary disturbance associated with project maintenance could create potential colonization sites for invasive plants. If such areas were monitored for 5 years post disturbance, there would be high likelihood that Eagle Crest could identify and control any invasive species colonizing these areas. Similarly, if Eagle Crest conducted a project-wide monitoring and control effort on a 5-year basis, spread of invasive species would be further minimized.

Effects of Construction on Wildlife

Construction effects on the vegetation community and habitat have the potential to affect wildlife through changing habitat characteristics. Construction of the proposed project would also require heavy vehicle traffic during the 4-year construction period, extended human presence, increased noise levels, and increased levels of artificial lighting. These factors have the potential to disturb and disorient wildlife, thereby increasing the susceptibility to predators, reducing foraging success, or disrupting breeding behavior. The potential for direct mortality associated with vehicular collisions would also increase.

Many of Eagle Crest's proposed measures associated with construction management discussed in the vegetation section would also apply to wildlife. In addition to those measures, Eagle Crest proposes several measures specific to the protection of local wildlife. To protect migratory birds, Eagle Crest would complete surveys in all potential nesting sites for active bird nests (Measure BIO-11). Eagle Crest would conduct these surveys in vegetated habitat during all construction activities that are scheduled to occur between about February 15 and July 30 (breeding season for migratory birds in the project area). In areas without wildlife exclusion fencing or those areas that have not been cleared of tortoises, Eagle Crest would limit construction activities to take place during daylight hours (Measure BIO-20). Additionally, Eagle

Crest would close, temporarily fence, or cover pipeline trenches at the end of each day (Measure BIO-21). Biological monitors would inspect open trenches to ensure animal safety. Eagle Crest would construct ramps leading out of the trenches to encourage animals to escape on their own.

In its comments on the draft EIS, Interior states that nesting for some bird species may begin as early as January 15 (and earlier, under favorable conditions). Interior recommends that Eagle Crest incorporate surveys for active nests starting after that date and that Eagle Crest develop an avian and bat protection plan to address potential effects on along with avoidance and minimization measures for migratory birds. Interior also states that the proposed 15-foot no-activity buffer is insufficient. Interior requests Eagle Crest and the Commission coordinate with FWS and California DFG on content and data required for quarterly reports and on species-specific needs to be included in a FWS- and California DFG-approved avian and bat protection plan. Interior also states it would like to have opportunity to provide technical assistance with the development of measures to assess and manage migratory bird access to brine evaporation ponds.

Our Analysis

During construction, increased human presence and noise associated with vehicles and heavy machinery would have unavoidable effects on local wildlife. Construction activities would also create hazardous areas for wildlife, including open pits and trenches, and shade areas associated with vehicles and material stockpile locations. Additionally, clearing of vegetation and grading to prepare vegetated areas for project facilities have the potential to disturb nesting birds and disturb or destroy animal burrows. The proposed transmission line route would bisect the DWMA within about 5.8 miles of the route in the management area. The State Water Board's preferred alternative transmission line route would be located outside the DWMA, although the route would border the management area for about 2.5 miles. Interior's preferred alternative transmission line route would border or be slightly inside the DWMA for about an additional 5.2 miles along Kaiser Road. As a result, the State Water Board's preferred alternative transmission line route would not bisect the DWMA and would reduce proximity of towers to the DWMA. Additionally, due to portions of the line traversing abandoned agricultural land, the quality of wildlife habitat along the State Water Board's preferred alternative transmission line route would be lower than that along the proposed transmission line route or Interior's preferred alternative route. Therefore, the State Water Board's preferred alternative route is expected to have the least effect on wildlife in the project area.

Eagle Crest's proposed measures, including the WEAP (discussed above), pre-construction surveys for breeding birds, and exclusionary measures to prevent animals from occupying hazardous areas would substantially reduce the construction effects. While it is not possible to completely eliminate all direct and indirect effects, the proposed measures would reduce disturbance to acceptable levels. Sufficient habitat exists in the areas immediately surrounding the project construction area such that the

majority of wildlife species are expected to temporarily disperse to less disruptive locations. Construction effects would also be temporary and would not create long-lasting detrimental effects or affect wildlife species at a population level and would be equally applicable to all of the transmission line routes.

Initiating surveys for migratory bird nests on January 15 would more adequately protect these resources and avoid violations of the Migratory Bird Treaty Act. A 15-foot buffer may not be adequate to protect birds from disturbance associated with heavy machinery, excavations, vegetation clearing, or other construction activities. If Eagle Crest consults with FWS, BLM, and California DFG to develop suitable buffer distances from located nests, disturbance to these areas would be further minimized.

Effects of Project Reservoir Operation on Wildlife

Operation of the project reservoirs would add about 254 acres of surface water to the project area. Given the arid nature of the surrounding area, it is likely the presence of this water would attract local wildlife. The steep terrain surrounding the reservoirs could pose a hazard for animals trying to reach the water edge, potentially resulting in serious injury or drowning. In addition, the water could attract predators, including ravens, gulls, coyotes, or feral dogs, increasing the density of predatory species in the project area and potentially increasing predation rates on local wildlife species.

To prevent wildlife access to the upper and lower reservoirs in these areas, Eagle Crest would construct an 8- to 10-foot-tall exclusionary fence designed to be impassable to large mammals (including Nelson's bighorn sheep, badger, fox, coyote, and deer) and desert tortoise (Measure BIO-18). Along the northern shore of the upper reservoir and in the northeast corner of the lower reservoir, a section of the fence (about 500 feet long) would be structured so that it would be inundated during high water, thereby providing wildlife access to high water but not allowing animals to enter the pit. Topography in these locations is less steep, providing easy access to drinking water for Nelson's bighorn sheep. Eagle Crest proposes to maintain the fence for the life of the project. Eagle Crest would inspect all fences on a monthly basis and during/following all major rainfall events. Eagle Crest also proposes to temporarily repair any damage to the fencing immediately, followed by permanent repair within one week.

To prevent effects of increased predation on wildlife, Eagle Crest developed a Predator Monitoring and Control Plan, filed on March 11, 2011. While this plan is specifically designed to reduce potential predatory effects on desert tortoise, it also would benefit other prey species, including small reptiles and mammals. Although predators could prey on other local wildlife in addition to sensitive species, we discuss this plan in more detail in section 3.3.4, *Threatened and Endangered Species*.

During the NEPA scoping process, several entities commented that Eagle Crest's proposed levels of groundwater pumping could affect regional aquifers or springs, depleting water resources available to wildlife. In response to these comments, Eagle

Crest notes that the existing geologic and hydrologic conditions in the project area preclude interaction between groundwater pumping and surface water availability.

In its letter in response to the Commission's Ready for Environmental Analysis (REA) notice, dated March 11, 2010, the National Parks Conservation Association comments that pumping groundwater to fill the project reservoirs could cause ground subsidence. Such subsidence could create depressions that could fill with water, drowning burrowing wildlife. In response to the National Parks Conservation Association's comment, Eagle Crest notes that based on the existing geologic conditions in the project area and its proposed levels of groundwater pumping, no subsidence is expected to occur and no wildlife would be affected by subsidence-related changes in the environment.

In its comments on the draft EIS, Interior states that while fencing the reservoirs may be effective at excluding large wildlife species, it is concerned about small mammals and reptiles that may gain access to reservoirs, become trapped, and potentially drown. Interior states FWS would like to assist with the development of exclusion fencing to ensure the fence design excludes but does not entrap wildlife species. Interior recommends fitting the lower portion of exclusion fence with a material (e.g., smooth metal) that would prevent access to reservoirs to all terrestrial species.

Our Analysis

The presence of the upper and lower reservoirs would provide tempting sources of water for local wildlife. Past mining activities created steep, rugged topography in areas adjacent to the proposed reservoirs. Most wildlife that use this habitat in the Eagle Mountains are adapted to traversing similar steep and rugged areas; however, attempts to access the waterline would prove hazardous and may cause injury or mortality to some individuals. Eagle Crest's proposed construction of exclusionary fencing is a prudent measure to prevent these effects. The proposed fence design is suitable to prevent access to most species in the project area. Regular inspections and maintenance would ensure the fence is in effective operating condition and also reduce potential for animals to be trapped in small openings.

With respect to Interior's comments about improving the proposed fence around the project reservoirs and brine ponds to exclude smaller wildlife species, we agree that this low cost measure would benefit local wildlife species. Installing a solid barrier along the lower portion of the fence would prohibit most small mammals, and reptiles from accessing the project reservoirs, limiting potential injury or health effects on these species and reducing project effects on wildlife. If Eagle Crest were to consult with FWS to develop the specific design of the exclusion fence, effects on wildlife would be further reduced.

Water quality in the project reservoirs would not pose a risk to wildlife. Instead, the reservoirs would provide a safe source of drinking water for bats and birds. The reservoir could also serve as a resting location for migratory birds. However, such use

would be limited because the reservoirs are not expected to develop much of a forage base for wildlife due to frequent turnover between the reservoirs and filtering associated with the reverse osmosis system.

With respect to implementation of Eagle Crest's proposed Predator Monitoring and Control Plan, the primary effects are discussed in section 3.3.4, *Threatened and Endangered Species*. Using desert tortoise as an indicator species, Eagle Mountain would implement predator control measures as necessary. These measures would also benefit local wildlife species.

As discussed further in section 3.3.2, *Water Resources*, Eagle Crest's proposed rate of groundwater withdrawal is not expected to cause subsidence, affect surface water availability, or affect vegetation. As such, we find that such groundwater withdrawal is unlikely to affect wildlife in the project area.

Effects of Project Brine Pond Operation on Wildlife

As discussed in section 3.3.2, *Water Resources*, the project facilities would include a reverse osmosis system and brine ponds to remove salts and metals from reservoir water and maintain total dissolved solids concentrations within the reservoirs at the level of the source water. The salts and heavy metals removed during this process would be concentrated into the brine ponds. Specific water quality of the ponds is discussed in section 3.3.2, *Water Resources*; however, the predicted concentrations of these compounds would pose a risk to wildlife. These ponds would have the potential to attract wildlife seeking water, and the high mineral content in the brine could pose health risks to wildlife, potentially resulting in mortality or reduced reproductive success. To prevent wildlife interaction with the ponds, Eagle Crest proposes to erect exclusionary fencing around this area. The fence design and maintenance would be similar to that described above for the reservoir fencing. However, because the fences would not limit access to birds, Eagle Crest proposes additional measures (Measure BIO-12) to discourage access and use habitat modification techniques and hazing to make the ponds less attractive to birds. Eagle Crest would monitor the success of these measures and based on monitoring results, implement adaptive management as necessary to ensure that bird use of the ponds is minimized, including, if feasible, enhanced hazing or pond covering that does not impede the evaporation function.

Our Analysis

Birds are likely to view the ponds as a safe source of drinking water or resting area. However, high total dissolved solids concentrations in these proposed ponds could be harmful or fatal to birds and other wildlife. Discouraging and/or preventing access to these areas is a necessary component of reducing project effects on avian species. Eagle Crest's proposed measure to make this area less attractive to birds, monitor bird use, and if needed, implement exclusionary covering to prevent access would reduce these effects. However, Eagle Crest's description of this measure does not provide enough detail to for us to fully analyze the effects. For example, the existing description does not indicate

what hazing methods would be used, or thresholds at which more extensive exclusionary devices would be implemented. If Eagle Crest developed and implemented more detailed brine pond management plan to reduce bird use of these areas, potential effects would be further reduced. Such a plan could include measures to: (1) minimize attractiveness and access to migratory birds; (2) establish a monitoring program to identify bird usage of the evaporation ponds, effectiveness of bird deterrents, and water quality; (3) incorporate adaptive management to include more intensive hazing measures or exclusionary pond covers, if warranted; (4) incorporate proposed hazing and habitat modification techniques; (5) incorporate methods for measuring success and thresholds for implementing exclusionary pond covering; and (6) develop an emergency response plan to address a potential breach in the pond berms or liners.

Effects of Transmission Line and Water Pipeline Operation on Wildlife

The California Essential Habitat Connectivity Plan identifies the project area as an “essential connectivity area” that links large blocks of undisturbed Mojave Desert habitat in the Chocolate Mountains and JTNP. In its comments on the draft EIS, the Center for Biological Diversity comments that the proposed project could disrupt habitat connectivity for wildlife. It also states that the proposed project’s transmission line could provide perching habitat for predatory birds, thereby increasing predation on local wildlife species.

To minimize effects of increased predatory pressure associated with the transmission line, Eagle Crest would implement the Predator Monitoring and Control Plan. This plan is discussed in more detail in section 3.3.4.2, *Threatened and Endangered Species*, but would include measures to monitor and, if necessary, control raven populations.

Our Analysis

The proposed project transmission lines and those preferred by the State Water Board and Interior would not provide any additional long-term barrier to wildlife movement beyond that which currently exists in the Chuckwalla Valley. The transmission lines would generally follow existing lines and would not prohibit wildlife from passing under them.

The water supply pipeline would be buried and would not pose any barrier to wildlife movement.

Sensitive Species

In general, the potential effects of the project on most sensitive species presented in table 18 are similar to the effects discussed above for general wildlife species. However, due to special habitat value within the project area, high population density in the project area, or potential for the project to have concentrated effects on a population, effects on some sensitive species are discussed in more detail below.

Effects of Construction on Special-Status Plants

Construction of the transmission line and water pipeline has the potential to affect sensitive plants species known to occupy the proposed ROW for these facilities. These species include California ditaxis, crucifixion thorn, desert unicorn plant, foxtail cactus, and Wiggins' cholla. Potential effects include direct mortality of the plants during vegetation clearing activities and reduced survivorship or reproductive success caused by changes in soil characteristics, microtopography, or water supply. Construction of the State Water Board's preferred alternative transmission line route would increase potential for these effects due to the greater length of the route. Eagle Crest proposes several measures to minimize the potential for these effects.

Eagle Crest would use pre-construction surveys to identify special-status plant populations and species protected by the California Desert Native Plants Act (CDNPA) (Measure BIO-6). Following surveys, Eagle Crest would establish avoidance areas in construction zones for special plant resources. Where avoidance is not feasible, Eagle Crest would salvage and transplant any species that can be reasonably transplanted in an approved area. Eagle Crest also proposes to comply with the CDNPA and consult with the Riverside County Agricultural Commissioner for direction regarding disposal of protected plants (Measure BIO-7).

Our Analysis

As currently proposed, construction of the project transmission line and water pipeline would occur in areas populated with sensitive plant species. Failure to appropriately plan locations for equipment stockpiles, lay down sites, pull sites, and support tower footprints would create increased potential for direct effects on these species, likely killing numerous individuals and small populations. However, considerable flexibility exists in the specific locations of these project features. Eagle Crest's proposal to conduct pre-construction surveys and designate avoidance areas would reduce potential effects on sensitive plants. Eagle Crest does not indicate how this information would be communicated to construction crews or to the Commission. Nonetheless, it is likely some disturbance would be unavoidable. This is especially true within the water pipeline ROW, where it is less feasible to make small adjustments to the disturbance area. In locations where disturbance is unavoidable, Eagle Crest's proposal to allow salvage activities, transplant any reasonably movable species, and coordinate with the County Agricultural Commissioner for direction regarding disposal would further reduce project effects. These measures would be equally effective along all three transmission routes analyzed.

Effects of Operation on Special-Status Plants

Maintenance activities that occur during project operations, including repair of transmission line support structures or the water pipeline, could require vegetation that would affect sensitive plants.

To reduce potential effects of project operations on special-status plants, Eagle Crest's WEAP requires that all maintenance activities potentially requiring ground disturbance occur in the presence of biological monitors. Additionally, in 2006 Eagle Crest entered into an MOU with FWS, BLM, and the Forest Service that provides guidelines for vegetation maintenance along transmission line ROWs on federal lands. This MOU also includes standards for protecting special-status plants.

Our Analysis

Maintenance of the project transmission line and water pipeline would occasionally require ground disturbance. We expect that the area of disturbance required for these activities over the life of the project would be small in relationship to the area disturbed during construction. Additionally, Eagle Crest would, to the greatest extent practical, site project features away from areas with high sensitive plant presence. Maintenance of these features is, therefore, unlikely to affect special-status plants. Eagle Crest's biological monitors would ensure that these activities do not affect special-status plants. No further measures are needed to protect these species from effects of project operation.

Effects of Construction on Nelson's Bighorn Sheep

Under the proposed schedule, major construction activities in the central project area are expected to last 3 to 4 years. During this time extensive use of heavy machinery including earth movers, dump trucks, cement trucks, and tunnel boring equipment would increase noise levels and increase human presence in this area compared to current conditions. These activities could disturb bighorn populations that spend much of the year in the mountainous areas surrounding the central project area. Construction of project roads and desert tortoise exclusionary fencing, as well as increases in artificial lighting, also have the potential to disrupt migratory paths for Nelson's bighorn sheep moving between available water sources and to breeding and lambing grounds. The potential for vehicular collisions is also a concern. Following construction, project operations would provide an additional water source accessible to Nelson's bighorn sheep in the northeast corner of the lower reservoir. Other areas around the reservoir perimeters would be fenced to exclude Nelson's bighorn sheep to prevent attempts to access water by traversing hazardous terrain.

Eagle Crest notes that while the construction period would increase human presence and noise levels over current conditions, the central project area has been heavily mined over the past several decades. Eagle Crest does not expect disturbance levels related to project construction to be substantially greater than the noise and human presence associated with the past mining activities. Rather, Eagle Crest expects bighorn movements to continue as they had in the past. To reduce the effects of project construction on Nelson's bighorn sheep, Eagle Crest's desert tortoise exclusion fencing along project roads would be limited to 3 feet in height so as not prevent Nelson's bighorn sheep movement. These fences would be removed following construction.

Our Analysis

Construction activities in the central project area would result in increased noise and human presence that could affect Nelson's bighorn sheep populations in the area. Without more detailed information about the migratory pathways the bighorn sheep currently use to move from Eagle Tank to Buzzard Spring or to breeding and lambing areas, it is unclear how this disturbance would affect the current populations. However, we find it reasonable to assume that the proposed levels of disturbance would be similar to the historical mining operations. Given the topography in the mine area, it is probable that migration paths traverse the perimeter of the mine and have not changed in recent years when the mine has been mostly inactive. Under this scenario, project construction activities would not create a migratory barrier, and we expect effects of project construction on Nelson's bighorn sheep populations would be minor and temporary.

Effects of Project Operations on Nelson's Bighorn Sheep

Operation of the project would include maintenance activities and fluctuating levels of standing water in the reservoirs. These conditions have the potential to attract Nelson's bighorn sheep into the central project area to access drinking water, increasing the risk of drowning or collisions with vehicles. Project lighting could also disturb this species, potentially affecting migration patterns.

During operations, Eagle Crest would reduce vehicle traffic to about one round trip per day. Wildlife exclusion fences would surround both reservoirs to prohibit Nelson's bighorn sheep from accessing water in unsafe locations, but fence setbacks would permit access in the northeast corner of the lower reservoir. Project facilities would be lighted as a safety and security precaution, and the lights would include shields to focus light on the project interior and prevent light pollution to surrounding areas (Measure BIO-22). Eagle Crest also proposes to provide limited access to water at both the upper and lower reservoirs. Eagle Crest would provide access to each reservoir via fence set-backs that would provide water access during full pool conditions, but still prohibit animals from entering the reservoir. These set-backs would be located on the north shore of the upper reservoir, opposite the south saddle dam, and at the northeast corner of the lower reservoir.

In their comments on the draft EIS, the Park Service, EPA, and Kaiser recommend additional study and post-construction monitoring of Nelson's bighorn sheep to determine effects of the project on migration and of project-related water subsidies located at the lower reservoir. The Park Service states that if bighorn sheep currently access water near the proposed reservoirs, providing future access to water in these locations is appropriate. However, if bighorn sheep do not currently access water in these locations, Park Service recommends Eagle Crest, prior to providing water access, study the potential effects of these water subsidies on bighorn sheep populations in the Eagle Mountains.

Our Analysis

Following construction, vehicle trips in the central project area, facility lighting and equipment noise may create disturbance for local bighorn sheep. Additionally, filling the mine pits with water and fencing the perimeter would prohibit bighorn sheep from traversing these areas. A fence setback at the lower reservoir would provide access to drinking water throughout the year. This feature could attract animals to this part of the project. Water availability in this area could also reduce the need for bighorn to travel to Buzzard Spring to access water during summer months.

Eagle Crest anticipates about one vehicle trip per day in the central project area during normal operations. During active mining operations, bighorn sheep were exposed to more frequent vehicle activity and were observed along roadways during these periods. Therefore, we do not expect vehicular activity or road maintenance to affect bighorn sheep safety or create barriers to movement in the project. Facility lighting is necessary to provide security for project facilities and increase safety for night workers. Eagle Crest's proposed measures to limit effects of lighting by using light hoods, minimizing light sources, and using low-light bulbs would minimize such effects on bighorn sheep to minor levels.

Project operations would create reservoirs in existing mine pits. Currently, the pits are open to bighorn sheep and these animals are known to enter the pits to access water following rains. It is also possible these areas are crossed during movement through the central project area. Installation of fences around the reservoirs as proposed by Eagle Crest would prohibit this access. However, the reservoirs themselves are small relative to distances bighorn sheep travel between watering sources or between populations within the metapopulation. Additionally, sheep traveling through the central project area are most likely to use undisturbed habitat between the upper and lower reservoir. The project would not create new disturbance in these areas and project activity centers near the powerhouse, switchyard, evaporations ponds, and administrative offices are unlikely to disturb sheep located in other parts of the central project area.

Eagle Crest's proposed fence set-backs would provide animals with access to drinking water along the north shore of the upper reservoir and the northeastern corner of the lower reservoir. The fence set-back at the upper reservoir is about 1.0 mile southeast of a natural spring, 0.7 mile west of a developed tank, and upslope from past water sources at the bottom of the pit. The fence set-back at the lower reservoir is about 1.0 mile from the developed watering tank associated with the Eagle Mountain water tank. Therefore, water has been available to bighorn sheep in the general location of the proposed fence set-back. These areas are removed from project facilities with heavy human presence. Other locations closer to more frequently occupied habitat or outside of disturbed areas would likely provide greater benefit to bighorn sheep.

However, water resources are already present in areas sheep are most likely to congregate. Development of new water resources within undisturbed mountainous habitat would require significant costs for construction and maintenance and could

require additional disturbance for installation. The Eagle Mountain bighorn sheep population is known to cross areas disturbed by mining activities to access water in the mine pits. While the lower reservoir is somewhat removed from recorded bighorn sheep locations (Divine and Douglas, 1996), new water resources in this location could benefit bighorn sheep traveling from the Coxcomb Mountains to the Eagle Mountains or Little San Bernardino Mountains. Therefore, Eagle Crest's proposed fence set-backs would provide a cost-effective mechanism to provide water subsidies for bighorn sheep in the Eagle Mountains and the benefits of this measure would offset potential disturbance associated with project construction and operation. The monitoring of the fence set-back as recommended by the Park Service could further ensure the measure provides suitable benefit for this species.

Effects of Construction on Burrowing Animals

Several sensitive species known to occur in the project area use burrows to escape the desert heat, hide from predators, and raise young. These species include badger, kit fox, and burrowing owl. Proposed construction activities have the potential to collapse these burrows or block their entrances, trapping animals inside. To prevent these effects, Eagle Crest proposes to continue consultation with California DFG to determine appropriate survey needs for the burrowing owl. Upon California DFG's request, Eagle Crest would conduct a Phase III survey for burrowing owl to further assess bird use of the project area and potential effects (Measure BIO-13). The Phase III survey would include a nesting season survey, followed by a winter survey if no burrows or owls are observed during the nesting season. Subsequently, Eagle Crest would conduct a pre-construction survey within 30 days of the start of project construction to assess species presence and the need for further mitigation. Because of the low observations of burrowing owls during the Phase I surveys, Eagle Crest notes that California DFG may not require the Phase III survey and only pre-construction surveys would be needed.

If the Phase III or pre-construction surveys indicate burrowing owls are present, Eagle Crest would limit the construction period to September 1 through February 1 to avoid disruption of breeding activities (Measure BIO-14). Eagle Crest would avoid active nests by designating a minimum of a 250-foot buffer until fledging has occurred (February 1 through August 31). Following fledging, owls could be passively relocated away from construction activities.

In its comments on the draft EIS, the Center for Biodiversity suggests that Eagle Crest create replacement burrows for any active owl burrows that are collapsed during construction or maintenance. The Center for Biodiversity also suggests that Eagle Crest acquire mitigation acreage for burrowing owl habitat. Interior recommends that following pre-construction surveys, Eagle Crest consult with FWS to determine the need to develop a relocation plan for burrowing owls.

To protect other sensitive burrowing animals, Eagle Crest would conduct pre-construction surveys for all burrows that might host a badger or kit fox (Measure BIO-

16). Eagle Crest would avoid active burrows and all fox natal dens where possible. Biological monitors would mark the perimeters of all avoidance areas with wooden stakes, at least 3 feet high, and no more than 10 feet apart. Where avoidance is infeasible, biological monitors would determine occupancy of burrows and encourage occupants to leave their burrows. Biological monitors would fully excavate all burrows from which badgers or foxes have been removed and collapse these burrows to ensure that animals cannot return prior to or during construction.

Our Analysis

If left unsurveyed or accounted for, project construction activities would likely cause injury or mortality to burrowing species through burrow collapse or entrapment. Given the low number of burrowing owls observed during project surveys, pre-construction surveys would provide adequate information necessary to develop mitigation measures for this species. Eagle Crest's proposal to conduct pre-construction surveys for active burrows and either avoid such areas, or when necessary destroy unoccupied burrows, would reduce potential for injury or mortality. However, Eagle Crest's proposal does not include any measures to relocate burrowing owls or construct replacement burrows.

We do not expect the project to have permanent effects on burrowing owl habitat. This species commonly occurs in utility corridors and along road sides. There are no project facilities within burrowing owl habitat that would preclude future use for this species. Therefore, the purchase of mitigation lands would not be necessary to minimize effects on this species. We note, however, that Eagle Crest would purchase mitigation lands for desert tortoise and expect these lands would also provide suitable protection for burrowing owl habitat.

In general, destruction of an unoccupied burrow does not pose an undue risk to the burrow's occupant, which typically relocates to other vacant burrows in the vicinity. Destruction of unoccupied burrows is the best method of preventing injury in construction zones. However, when occupants are under additional stresses associated with nesting, birthing, or caring for young, burrow removal is not the appropriate option. Eagle Crest's proposal to avoid active burrowing owl nests and natal kit fox dens would prevent additional effects on these species. These measures would be equally effective along all three transmission routes analyzed.

Effects of Operation on Burrowing Animals

Maintenance activities that occur during project operations, including repair of transmission line support structures or the water pipeline, could require ground disturbance activities in areas with animal burrows.

To reduce potential effects of project maintenance on burrowing animals, Eagle Crest's WEAP requires that all maintenance activities potentially requiring ground disturbance occur in the presence of biological monitors. These monitors would follow

the same protocols discussed above for clearing burrows and ensuring special-status burrowing species are not affected.

Our Analysis

Maintenance of the project transmission line and water pipeline would occasionally require ground disturbance. We expect that the area of disturbance required for these activities over the life of the project would be small in relationship to the area disturbed during construction. Eagle Crest's biological monitors would ensure these activities do not affect burrowing animals.

Effects of Project Construction on Raptors

Several sensitive raptor species, including prairie falcon and golden eagle, could suffer effects of project construction if there are active nests near activities proposed in the central project area. Loud staccato noises and vehicle noise could disrupt nesting activities or cause nest abandonment.

In the final license application, Eagle Crest proposed to conduct pre-construction surveys in the central project area to determine whether any active golden eagle or prairie falcon nests are present (Measure BIO-15). If surveys identified active nests, Eagle Crest proposed to provide protective 0.25-mile-radius buffers around the nests and stated that no construction activities would occur within these buffer areas during the nesting seasons.

In its letter filed on March 12, 2010, FWS recommends that Eagle Crest consult with FWS to determine the need for golden eagle surveys.

In its reply to FWS, Eagle Crest notes that in response to new regulations and guidelines finalized subsequent to the filing of the final license application, Eagle Crest is engaging in consultation with FWS with regard to golden eagle surveys. Eagle Crest conducted surveys during the 2010 nesting season. In its July 7, 2010, filing, Eagle Crest provided a report documenting raptor surveys in the project area. A summary of the results of this study is presented in section 3.3.3.1, *Terrestrial Resources, Affected Environment*.

In its comments on the draft EIS, the Park Service recommends protection buffers for active golden eagle nests be extended to 1.0 mile, as found in Richardson and Miller (1997).

Our Analysis

If carried out near active raptor nests, project construction activities in the central project area would disturb nesting pairs and potentially cause nest abandonment. The Eagle Crests raptor survey report presents maps showing the locations of golden eagle nests in the project vicinity. However, proposed project features are not included on these maps, and there is no discussion as to what distance these nests are from project components. Therefore, the report does not provide sufficient detail to determine the

need for protection buffers or time of year restrictions on construction activities. Eagle Crest's proposed measures include pre-construction surveys and development of protective buffer areas as needed. The results of the summer 2010 raptor surveys indicate that further analysis and implementation of this measure are warranted. We also concur with Park Service that 1.0-mile protection buffers would be more appropriate than the proposed 0.25-mile buffers to protect golden eagles. If Eagle Crest consults with FWS, the Park Service, and California DFG during the final design engineering phase of the project to identify locations of active nests and implement protection buffers to limit disturbance in these areas, construction effects on raptors would be minimized. These measures would be equally appropriate along all three transmission routes analyzed.

Effects of Project Operation on Raptors

The proposed project transmission line has potential to affect raptors due to in-flight collisions with conductors or electrocution. Additional perching or nesting sites associated with the transmission line could have beneficial effects on some raptor species, but could also cause increased predation on local wildlife.

In its comment letter filed on March 12, 2010, FWS recommends that Eagle Crest ensure compliance with Avian Power Line Interaction Committee (APLIC) recommendations and develop an avian protection plan that meets FWS guidelines. FWS also recommends co-locating the new line with existing lines in the project area. FWS states that this would reduce the creation of new perching and nesting sites for desert tortoise predators.

Eagle Crest filed a response to the FWS recommendations on April 23, 2010. In this response, Eagle Crest states that it would design and construct raptor-friendly transmission lines in strict accordance with the industry standard guidelines set forth in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC, 2006) (Measure BIO-24). In addition, prior to the start of ground-disturbing activities, Eagle Crest would develop and file for Commission approval a transmission line design plan that would consider adequate separation of energized conductors, ground wires and other metal hardware, adequate insulation, and any other measures necessary to protect raptors from electrocution hazards.

Our Analysis

Avian injuries and fatalities associated with electrocution or collision with power lines have been reported since the late 1800s, and as power lines have proliferated across the country, bird losses have increased dramatically. A recent report estimated that fatalities in the United States range from 3.5 million to 1.05 billion birds every year (Hunting, 2002). Most electrocutions are associated with lines carrying 69 kV or less because the spacing of hardware is often not sufficient to prevent birds from spanning between conductors or between a conductor and a ground (APLIC, 2006). The project would include a 13.5-mile double-circuit 500-kV line and a 4,000-foot-long 18-kV line from the powerhouse to the collector substation.

Improper construction of project electric transmission facilities could pose increased risks to raptor injury and mortality. APLIC provides industry standards for electric transmission system design measures aimed at reducing effects on birds. These standards include spacing conductors such that they are beyond the wing span of large birds to prevent electrocution, as well as measures to increase line visibility to reduce potential for collisions. Eagle Crest proposes to construct the transmission line in compliance with these standards and to prepare a plan, for Commission approval, to protect raptors from electrocution hazards. However, Eagle Crest's proposed measure does not address potential for avian collisions or procedures for monitoring and reporting avian injury or mortality resulting from interactions with the proposed project transmission line. Addressing these components, in addition to implementing measures related to potential electrocution, would be necessary to meet the APLIC/FWS guidelines for an avian protection plan.

If Eagle Crest prepares an avian protection plan, in consultation with FWS, that includes design measures for reducing potential for electrocution and collision injuries, provides methods for surveying and reporting project related raptor mortality, incorporates a worker education plan pertaining to avian-power line interactions, and procedures for managing nesting on power line structures, effects of project operation on raptors would be minimized. Such a plan would assist Eagle Crest in meeting the requirements of the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

Constructing new transmission support towers would increase perching and nesting structures for birds, including desert tortoise predators. However, constructing these new towers in areas where similar towers already exist would limit the spatial distribution of these resources. While the new towers would still present potential nesting and perching structures, the proximity of these structures to the existing structures could limit their suitability. Both ravens and other raptors nest in defended territories and are not likely to nest near pre-existing nests. Therefore, constructing the new line adjacent to existing lines would limit the creation of new nest sites. The State Water Board's preferred alternative transmission line route would be co-located with existing structures and removed from mountainous nesting habitat. This preferred route would address FWS concerns regarding the addition of new nesting habitat and is expected to have the lowest effect on raptors.

Effects of Construction on Bats

Based on existing information, it is probable that some sensitive bat species use the rocks, crevices, or caves in the central project area as roosting habitat. If roosting locations are occupied during the filling of project reservoirs, these areas could be inundated, causing disturbance, injury, or mortality to sensitive species. To reduce the potential for project effects on sensitive bats, Eagle Crest proposes to conduct pre-construction bat surveys, using a qualified bat biologist, to determine the existence, location, and condition of bat roosts on the project site. The survey would also identify

foraging habitat in the project area. Based on the results of these surveys, Eagle Crest would prepare a mitigation plan to avoid roosting and foraging effects on resident bats, minimize that disturbance, or as an unavoidable measure, evict bats (Measure BIO-17).

Our Analysis

Based on the data available for the central project area, we find that occurrences of bat roosts at the Eagle Mountain mine site are likely. Inundating these areas without implementing mitigation measures could affect bat roosting and foraging habitats. Eagle Crest's proposal to conduct pre-construction surveys and, depending on the survey results, to develop and implement a bat protection and mitigation plan, would likely reduce these effects. However, Eagle Crest has not provided any details for avoiding roosting and foraging habitats, minimizing disturbance, addressing bat eviction, and monitoring and evaluating program success.

Effects of Operation on Bats

Operation of the project would include lighting the central project area and fluctuating water levels in the reservoirs. The addition of lights and water would likely result in increases in insects in the area of the project reservoirs. These insects could provide a food source for bats. Fluctuation of the reservoir water levels associated with generation activities could result in suitable roosting areas being available at one time of day but then flooded later in the day. Bats using these roosts could be trapped by rising water levels.

In its comments on the draft EIS, the Park Service states that water in the reservoirs would be available to bats that drink while flying and that it is likely that many of the bat species would be affected by this increased water subsidy.

To reduce to potential for project effects on sensitive bats, Eagle Crest proposes to prepare a mitigation plan to avoid roosting and foraging effects on resident bats, minimize that disturbance, or as an unavoidable measure, evict bats (Measure BIO-17). Preparation of this plan would occur following surveys to determine bat presence in the central project area.

Our Analysis

Inundation of roosting areas could affect bats, including sensitive bat species if these areas are left open and accessible during low water periods and then inundated during roosting periods. Adding lights to the central project area would attract insects to the areas. Bats are also likely to come to these areas to feed and drink, resulting in an increased likelihood that the available roosting habitat in the central project area would be occupied. Eagle Crest's proposal to conduct pre-construction surveys and, based on the survey results, develop and implement a bat protection and mitigation plan would reduce these effects. If Eagle Crest were to prepare this as described above, it could ensure the bat protection and mitigation plan would be most effective.

Effects of Construction on Couch's Spadefoot Toad

The project could affect Couch's spadefoot toad if grading, construction of project roads, or construction of other project facilities alter topography or water availability to existing ephemeral pools that contain this species. Since small populations of these toads occur in isolated depressions that generally gather small amounts of water, small changes in topography and water availability has the potential to eliminate an entire population in an affected depression.

To reduce potential for project effects on this species, Eagle Crest, in compliance with the NECO Plan, proposes to avoid effects on all ephemeral pools in the project area. Once access is permitted, Eagle Crest would conduct surveys for ephemeral pools in the central project area. If present, the pool would be avoided, if possible. If avoidance is not possible, then Eagle Crest would construct a new pool as close as is feasible to replicate and replace each lost pool. All larvae would be moved to the new pool (Measure BIO-10).

Our Analysis

Eagle Crest's surveys indicate that there are no ephemeral pools along the proposed transmission line or water pipeline ROWs. However, these surveys have not been conducted along the additional alternatives. Eagle Crest's proposed measure to survey the central project area for ephemeral pools and avoid these areas or relocated toads to other suitable habitat would eliminate potential effects in this area. If the final transmission line is constructed in areas not previously surveyed for ephemeral pools, there is potential for effects on Couch's spadefoot toad. If Eagle Crest conducted pre-construction surveys in all areas of proposed construction activity not previously surveyed in 2009, and implemented the same protection measures proposed for the central project area, then potential effects of the transmission line would be eliminated.

Effects of Operation on Couch's Spadefoot Toad

Maintenance activities that occur during project operations, including repair of transmission line support structures or the water pipeline, could require ground disturbance activities that have the potential to alter local patterns of surface runoff. There is potential for these activities to disturb Couch's spadefoot toad habitat.

To reduce potential effects of project maintenance on burrowing animals, Eagle Crest's WEAP requires that all maintenance activities potentially requiring ground disturbance occur in the presence of biological monitors. These monitors would follow the same protocols discussed above for identifying and protecting sensitive habitat, including ephemeral pools.

Our Analysis

Maintenance of the project transmission line and water pipeline would occasionally require ground disturbance. We expect that the area of disturbance required

for these activities over the life of the project would be small in relationship to the area disturbed during construction. Eagle Crest's biological monitors would ensure these activities do not affect potential habitat for Couch's spadefoot toad.

3.3.3.3 Cumulative Effects

During project scoping several terrestrial resources were identified for which the Eagle Mountain Project, in conjunction with other reasonably foreseeable projects, could have cumulative effects. These resources include desert bighorn sheep and raven populations. To analyze potential cumulative effects on these resources, we evaluated the combined effects of the proposed project, the proposed Eagle Mountain landfill, and solar projects proposed in the Chuckwalla Valley.

Nelson's Bighorn Sheep

Both the proposed project and the Eagle Mountain landfill (if constructed; see *Land Use* in section 3.3.5) would occupy lands in the central project area. As discussed above, desert bighorn sheep are known to occur in this area and to migrate between natural sources of drinking water located to the north and south of this area. Construction and operation of these projects could disturb bighorn sheep by increasing noise and human presence in the area. Combined, these projects are expected to occupy 6,875 acres, 47 percent of which would be associated with the pumped storage project. Construction of the two projects is not expected to occur simultaneously, so there would not be cumulative effects of construction at one time. However, construction of both projects could result in prolonged increases in noise-related stress that could affect bighorn sheep in the project area over the total construction period.

Construction activities are expected to involve about 75 trucks per month for the project and 1,500 trucks per month for the landfill (see *Land Use* in section 3.3.5). Eagle Crest does not propose to develop any new access roads or conduct any road improvements within the central project area. For the landfill, Eagle Crest would construct 6 miles of new, paved access roads, and widen an additional 6 miles of existing road. During operation, Eagle Crest expects to require 2 truck trips per day, while the landfill operations, Eagle Crest would require between 50 to 100 trucks per day depending on the age of the project. Eagle Crest's estimate of 75 trucks per month seems low for the amount of materials needed for the proposed project. However, even if this number is increased by a factor of 10, the contribution of the proposed project to total stress associated with construction noise would be small compared to that associated with construction of the landfill.

Proposed solar projects would be located on the valley floor and are not expected to affect desert bighorn sheep. Based on these predicted use levels, we find that construction and operation of both the proposed project and the Eagle Mountain landfill could affect desert bighorn sheep in the central project area. However, the Eagle Mountain Project would constitute a small percentage of these effects and Eagle Crest's

proposed measures to reduce effects on desert bighorn sheep would mitigate for its share of any cumulative effects.

Ravens

Both the proposed project and the Eagle Mountain landfill (if constructed; see *Land Use* in section 3.3.5) would occupy lands in the central project area, and each project is expected to provide increased food availability to ravens. The proposed project would increase available drinking water associated with project reservoirs (254 acres) and nesting and perching habitat associated with the transmission line (13.5 miles). As discussed above, all of these resources are already present in the landscape surrounding the project, including power lines and Colorado River Aqueduct water. If proposed solar facilities are constructed in the Coachella Valley, additional transmission lines would be constructed, providing additional nesting and perching habitat. The Eagle Mountain landfill would increase available food sources associated with the importation of waste to the central project area. The closest similar type of food subsidies for ravens would be at the Desert Center Sanitary landfill. The Eagle Mountain landfill would include multiple mitigation measures to prevent ravens from accessing waste. These measures would include hourly burial of waste deposits, removal of potential perching areas, and experimental treatments with additions of chemical deterrents. The landfill would also monitor raven populations. If both projects are constructed, the combined effects of increased food sources would likely create conditions suitable for expansion of the raven populations. While transmission lines and water sources currently exist in the project vicinity, there is potential for the combination of water subsidies to be co-located with food subsidies, resulting in cumulative effects on raven populations. However, Eagle Crest's proposed measures to study effects of the project on ravens and other desert tortoise predators and implement control measures as needed would ensure the collective effects on ravens with the landfill project are not substantially greater than the effects of the proposed landfill and solar facilities alone.

Both the proposed project and the Desert Sunlight Solar Farm (BLM, 2010a) would require construction of new transmission lines to interconnect with the electric grid. As proposed, Eagle Crest would construct a new substation near Desert Center and create a new 500-kV transmission corridor along Eagle Mountain Road. As a component of the Desert Sunlight Solar Farm Project, SCE would construct the Red Bluff substation about 6 miles east of Desert Center along the Interstate 10 corridor and construct a new 230-kV transmission line that would parallel the existing SCE 161-kV line. The State Water Board's alternative for the proposed Eagle Mountain Project would use the same substation and transmission corridor for both the Eagle Mountain and Desert Sunlight Solar Farm projects, consistent with the California Public Utilities Commission environmentally preferred alternative for the Desert Sunlight Solar Farm (BLM, 2010a). Under this alternative, disturbance to terrestrial resources would be reduced by eliminating the need for a second substation and effects on ravens would be reduced by

minimizing the addition of new transmission structures that would create favorable nesting habitat.

Co-locating transmission lines for the proposed Eagle Mountain Pumped Storage Project and Desert Sunlight Solar Project within the same corridor would reduce potential effects on desert tortoise. The support structures for each transmission line would likely provide nesting areas for ravens, a desert tortoise predator. Ravens exhibit territorial nesting behavior and aggressively defend their nesting area from other large birds, including other ravens, are within a 2-mile radius from an active nest (FWS, 2008). Such territorial nesting behavior and limited geographical distribution of the proposed support structures could reduce the number of potential nest sites created by the new transmission lines. However, our analysis indicates that the State Water Board's preferred alternative transmission line route would have lesser effects on desert tortoise and other terrestrial resources. The State Water Board's preferred alternative transmission line route would use an existing transmission corridor and cross areas disturbed by agriculture practices, requiring less disturbance to intact desert tortoise habitat in the DWMA and the Chuckwalla Critical Habitat Unit. In analyzing the potential effects of the Desert Sunlight Solar Project, the California Public Utilities Commission cited similar reasons for selecting the existing transmission corridor as its environmentally superior alternative for the solar project. However, BLM identified the Kaiser Road route as its preferred alternative for the Desert Sunlight Solar Project. Given this discrepancy in the Desert Sunlight Solar Project Final EIS, and since the solar project has yet to initiate construction, we cannot be certain the California Public Utilities Commission transmission line would ultimately be located along Kaiser Road.⁵⁵

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

Two special-status species with the potential to occur in the proposed project area are federally listed as threatened or endangered: Coachella Valley milkvetch (*Astragalus lentiginosus* var. *cochellae*) is endangered and desert tortoise (*Gopherus agassizii*) is

⁵⁵ The Record of Decision for the Desert Sunlight Solar Project was issued in August 2011. BLM authorized two alternatives for the transmission line: gen-tie A1 parallels Kaiser Road to Desert Center then travels east to the proposed Red Bluff substation; gen-tie A2 parallels the existing 115-kV line from Kaiser Road before turning south to the proposed Red Bluff substation. The Record of Decision identified gen-tie A-2 as the better route because it would have fewer effects on the desert tortoise and visual resources. However, the Record of Decision also approves gen-tie A-1 to be used in the event Desert Sunlight is not able to secure rights to the private lands located along the gen-tie A-2 transmission line route. Desert Sunlight would be required to relinquish rights to one route prior to construction of the transmission line. Construction of the solar arrays was initiated in September 2011.

threatened. In addition, the milkvetch is listed as sensitive by BLM and List 1B by CNPS and the desert tortoise is listed as threatened and protected by California DFG.

Coachella Valley Milkvetch

This subspecies occurs primarily from the Coachella Valley east to Desert Center. Off-highway vehicle (OHV) recreational use is one of the greatest threats to this species, and many populations may no longer exist.

The species is distinguished from other silky-haired milkvetch species by its strongly inflated, two-celled, papery, speckled seed pods. It is an herbaceous perennial whose aboveground portions die back during drought periods. While it is restricted to loose-sandy, including aeolian (wind-blown), soils, the substrate over the soil may be slightly gravelly. Microhabitat sites are often associated with disturbance, consistent with many legumes, and individuals are commonly found in road berms. FWS has designated several critical habitat units for this species along the Interstate 10 corridor between Indio and Palm Springs, California. No critical habitat is present in the project area.

Eagle Crest conducted surveys for this species in concert with surveys for desert tortoise in spring 2008 and 2009.⁵⁶ Surveyors did not encounter any Coachella Valley milkvetch in the project area.

Desert Tortoise

The desert tortoise inhabits the Southwest in areas north of Baja California, with a current range extending from southwestern Utah, west to the Sierra Nevada Range in California, and south through Nevada and Arizona into Sonora, Mexico.

The desert tortoise occupies arid habitats below 4,000 feet. In the Colorado and Sonoran deserts of southern California and Arizona, desert tortoises occupy somewhat lush desert habitats, with increased bunch grasses, cacti, and trees. Because of the burrowing nature of tortoises, soil type is an important habitat component. In California, tortoises typically inhabit soft sandy loams and loamy sands, although they are also found on rocky slopes and in rimrock that provide natural cover sites in crevices. Hills with rounded, exfoliating granite boulders often host higher densities than the surrounding flats, especially in Arizona. Valleys, alluvial fans, rolling hills, and gentle mountain

⁵⁶ In both 2008 and 2009, surveyors were not given access to Kaiser properties for surveying. The exclusion area included the proposed project water pipeline ROW west of the Colorado River Aqueduct and the transmission line ROW north of UTM 3745200N (North American Datum 83). As a result, Eagle Crest was unable to conduct onsite surveys of the mine pits that would form the reservoirs and other central project areas.

slopes are inhabited. The only areas tortoises typically avoid are intermittent lakes and steep, talus-covered slopes.

In 1989, information on high mortality rates and the presence of an upper respiratory tract disease in populations of the desert tortoise resulted in a temporary emergency listing as endangered (FWS, 2010a). The Mojave population—which inhabits California (including the project area), Nevada, Utah, and parts of Arizona north of the Colorado River—was listed in the final rule on April 2, 1990, as threatened. The 1994 Recovery Plan identified six evolutionarily significant units of the desert tortoise in the Mojave Region, based on differences in tortoise behavior, morphology and genetics, vegetation, and climate. Within those recovery units, suggested DWMA act as reserves in which recovery actions are implemented. The NECO Plan furthers this recovery goal by prescribing conservation and management measures for DWMA. The DWMA intersects 17.7 acres of the project (table 19). By contrast, under the staff alternative, the project would affect 0.1 acre of DWMA (table 19).

Table 19. Acreage of desert tortoise habitat in the Eagle Crest project area (Source: Eagle Crest, 2009a).

Project Element	DWMA	FWS Critical Habitat	BLM Category 3 Habitat	Total in Desert Tortoise Habitat
Central project area (total acreage of reservoirs and constructed project features) ^a	0	0	60.1	60.1
Desalination area	0	0	48.4	48.4
Roads	0	0	6.7	6.7
Eagle Creek channel modifications	0	0	5.0	5.0
Water pipeline (30-foot ROW)	0	0	22.9	22.9
Transmission tower footprint plus construction area (3,600 square feet per tower)				
Proposed	2.1 (27 towers)	2.4 (29 towers)	1.6–2.7 (19–33 towers)	4.0–5.1 (48–62 towers)

Project Element	DWMA	FWS Critical Habitat	BLM Category 3 Habitat	Total in Desert Tortoise Habitat
State Water Board's preferred alternative	0.1 (1 tower)	0.3 (3 towers)	3.8 (46 towers)	4.2 (51 towers)
Interior's preferred alternative	2.6 (31 towers)	1.5 (18 towers)	2.1 (26 towers)	6.2 (75 towers)
Access road (20-foot ROW)				
Proposed	15.6	16.6	14.7	31.3
State Water Board's preferred alternative ^b	0.02	0.06	24.4	24.5
Interior's preferred alternative ^c	18.9	10.9	15.3	45.1
Pulling/tensioning sites				
Proposed	Currently unknown (intended to fall within the transmission line ROW and substation site)			
State Water Board's preferred alternative				
Interior's preferred alternative				
Equipment laydown sites				
Proposed	0	0	0	0
State Water Board's preferred alternative	0	0	0	0
Interior's preferred alternative	0	0	0	0

Project Element	DWMA	FWS Critical Habitat	BLM Category 3 Habitat	Total in Desert Tortoise Habitat
Proposed interconnection collector substation				
Proposed	0	0	25	25
State Water Board's preferred alternative	0	0	0	0
Interior's preferred alternative	0	0	0	0
Total project acreage				
Proposed	17.7	19	125.4	144.4
State Water Board's preferred alternative	0.1	0.4	111.3	111.8
Interior's preferred alternative	21.5	12.4	100.4	134.3

- ^a Our assessment of habitat presence in the central project area is based upon Eagle Crest and our review of current (2011) aerial photography within a GIS environment. These estimates would be refined following preconstruction tortoise surveys.
- ^b Disturbance areas associated with access roads along the State Water Board's preferred alternative transmission line route were calculated based on Eagle Crest's vegetation maps and under the assumption that the transmission line and water pipeline would share access roads where they are both within the 160-kV corridor.
- ^c Assumes the segment along Kaiser Road would be constructed on the west side of the road, inside of the DWMA and the segment along the Critical Habitat Unit boundary would be constructed to the south and inside of the Critical Habitat Unit in order to be on federal land.

FWS designated critical habitat for desert tortoise in the Mojave Region in 1994 (50 CFR Part 17). The proposed project would cross portions of the Chuckwalla Unit, which encompasses 1,020,600 acres in Riverside and Imperial counties, California. This area provides nesting, sheltering, foraging, and dispersal habitat and contributes to species gene flow.

During March and early April of 2008, 2009, and 2010, Eagle Crest conducted surveys for the desert tortoise along the project's linear elements and at potential well sites. In 2008, the proposed project routes were preliminary, so surveys were conducted

both on areas where the project could ultimately occur and areas that were later eliminated from consideration in 2009. Because of the uncertain nature of the proposed routes in 2008, the extensive survey protocol required by FWS for desert tortoises was not used. Rather, Eagle Crest used the following procedures to collect evidence of desert tortoises:

- Transmission Line ROW—Inside Wildlife Habitat Management Areas (WHMAs), surveyors walked four, 50-foot-wide, adjacent transects within the 200-foot transmission line ROW; outside WHMAs, surveyors walked two, 100-foot-wide, adjacent, meandering transects in the ROW.
- Water Pipeline ROW—Where the proposed ROW was precise, surveyors walked a 30-foot-wide transect; where the ROW was imprecise, surveyors walked two, 100-foot-wide, adjacent, meandering transects.
- Other ROWs—For ROWs through abandoned jojoba fields that had access roads, only the roadsides were surveyed.
- Potential Well Sites—Surveyors examined all known commercial wells in the project area that had the potential to supply water to the project.

In 2009, pedestrian transects were completed consistent with the FWS desert tortoise survey methodology. Per those protocols, 100 percent of the ROWs were surveyed using parallel, 30-foot-wide, pedestrian belt transects. The ROW for the proposed transmission line is 200 feet wide. Eagle Crest surveyed a 60-foot ROW associated with the proposed water pipeline to account for minor route shifts in the final 30-foot-wide ROW. In addition, Eagle Crest surveyed a 30-foot-wide zone-of-influence (i.e., both sides of the ROWs at 100, 300, 500, 1,200, and 2,400 feet from the outer edges of the ROWs). The exception to this occurred where the ROWs went through jojoba fields, which are not tortoise habitat, although it is recognized that a tortoise could enter these areas from adjacent native habitat, even if unlikely.

In 2010, Eagle Crest completed FWS protocol surveys along the additional alternative transmission lines identified during preparation of the State Water Board EIR. These surveys included areas along the State Water Board's preferred alternative transmission line route, the Desert Sunlight Solar Farm Project preferred route along Kaiser Road and the northern boundary of the Chuckwalla Critical Habitat Unit, and the east and west Red Bluff substation alternatives.

In all 3 years, all tortoise signs (e.g., individuals, dens, burrows, scat, tracks, pellets, skeletal remains) that surveyors encountered were measured, mapped and described relative to condition, size, and (where applicable) gender. Current and recent weather conditions were recorded to identify the potential for tortoise activity and the topography, drainage patterns, soils, substrates, plant cover, anthropogenic disturbances, and aspect-dominant, common, and occasional plant species were described and mapped. Surveyors used Global Positioning System (GPS) units to map sign and habitat features.

During 2008, surveyors encountered 3 tortoise burrows and 1 carcass in the project area that was surveyed. In 2009, following the FWS protocol, Eagle Crest's surveyors encountered 34 burrows, 8 carcasses, 16 scat piles, and 2 live tortoises. The 2010 FWS protocol surveys along the State Water Board's preferred alternative transmission line route recorded 6 burrows, 4 carcasses, 4 scat piles, 4 sets of tracks, and 1 live tortoise. Figure 14 depicts the results of the 2010, 2009, and 2008 desert tortoise surveys.

3.3.4.2 Environmental Effects

Coachella Valley Milk Vetch

Effects of the project on Coachella Valley milk vetch would occur only through direct disturbance to individuals present in the project area. Eagle Crest's surveys indicate this species does not occur in the project area.

The Park Service states that because the entire project area was not surveyed, there may be potential for this species to occur within the proposed project boundary. In its comments on the draft EIS, the Park Service recommends that the WEAP include training so that employees are able recognize Coachella Valley milkvetch. The Park Service also recommends Eagle Crest include this species in the pre-construction sensitive plant surveys.

While the project area contains little, if any, potential habitat for this species, the inclusion of Coachella Valley milkvetch in the pre-construction plant surveys and training of employees to recognize this species would be low cost measures that would increase potential for identifying and protecting this species if it does occur in the area. With implementation of these measures, we find the project would not affect Coachella Valley milk vetch.

Effects of Construction on Desert Tortoise

Construction of the project would involve the use of heavy machinery, road grading, vegetation removal, and heavy vehicle traffic in the project area. These activities have the potential to destroy desert tortoise burrows, increasing stress to individuals or potentially causing mortality if burrows are occupied at the time of collapse. Tortoises often seek shelter under vegetation or other structures that provide shade from the desert sun. Mechanized clearing of these structures could harm individual tortoises. Desert tortoises also seek shelter under parked vehicles and travel along road grades. Increased vehicle use in the area could create increased risk of collisions with tortoise, resulting in injury or mortality. In addition to measures already discussed, including the WEAP, Revegetation Plan, and Invasive Species Monitoring and Control Plan, which could help reduce effects on desert tortoise, Eagle Crest proposes the following measures to reduce the effects of construction on this species: pre-construction and clearance surveys; monitoring during construction; exclusion fencing; and the Desert Tortoise Clearance and Relocation/Translocation Plan.

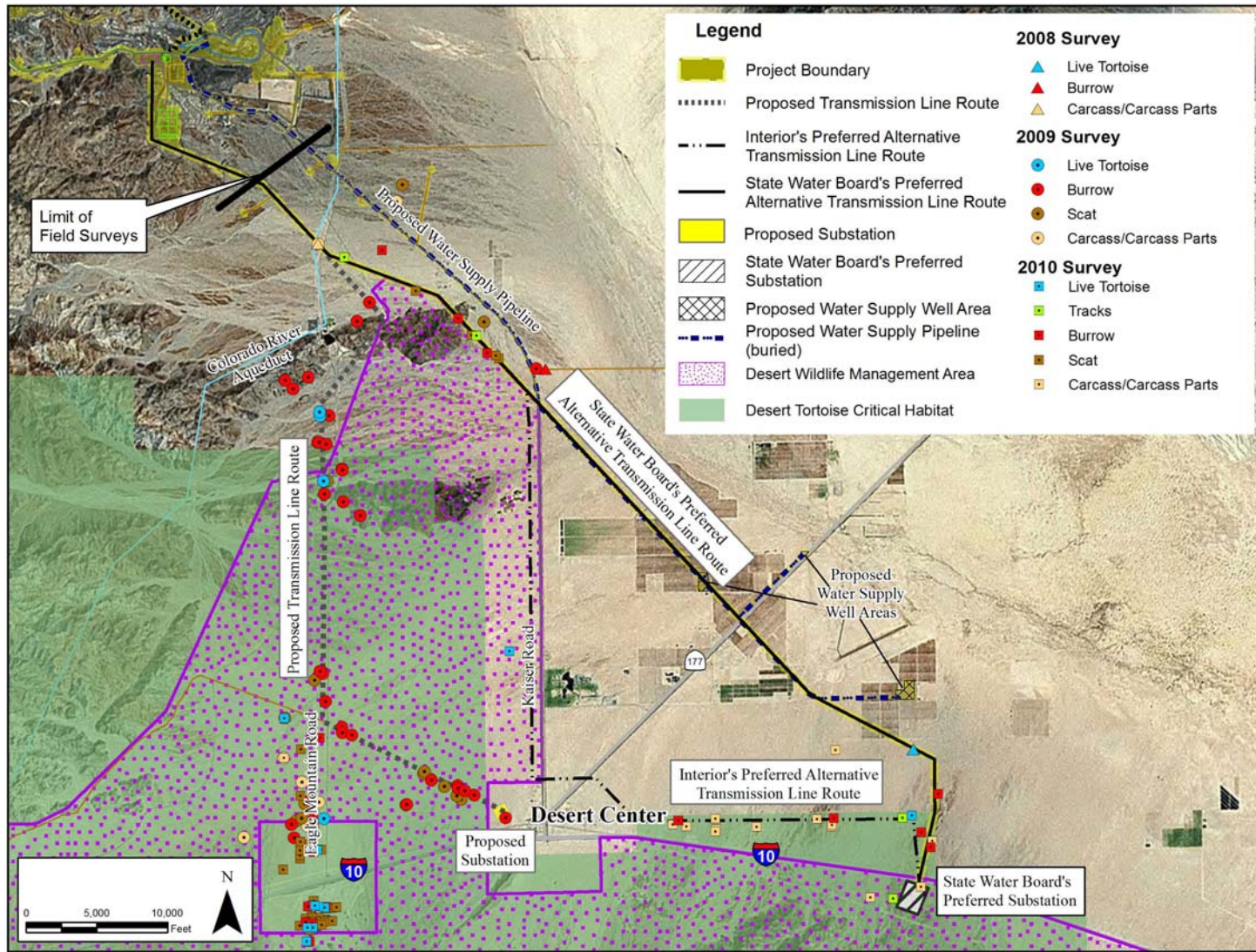


Figure 14. Results of 2010, 2009, and 2008 desert tortoise surveys (Source: State Water Board, 2010, and ESRI, 2010, 2010, as modified by staff).

Within the central project area, construction of access roads, the brine ponds, and modifications to Eagle Creek channel would affect about 60.1 acres of desert tortoise habitat. The effects would be the same for both the proposed alternative and the staff alternative. In these areas, Eagle Crest would first conduct surveys to determine the presence of desert tortoise. Based on the results of these surveys, Eagle Crest would refine estimates of disturbed desert tortoise habitat. If there is any suggestion of tortoise presence, either due to the presence of tortoise habitat and/or tortoise sign, Eagle Crest would erect exclusion fencing and complete a clearance survey to remove tortoises from within the fenced area (Measure DT-3). Biological monitors would complete a minimum of two clearance passes inside this area with each survey occurring during periods with heightened tortoise activity, from mid-March to mid-April and during October.

The applicant's proposed transmission line would occupy about 82 acres of desert tortoise habitat. The proposed line includes 27 line support structures in the BLM DWMA, 29 structures in the Chuckwalla Unit of critical habitat, and 19-33 structures in other suitable habitat for desert tortoise. All of the structures within the BLM DWMA and critical habitat would be along a new transmission corridor and removed from existing transmission lines. For part of its length within the BLM DWMA and critical habitat (about 3.5 miles), the applicant's proposed transmission line would run parallel to the existing Eagle Mountain Road and therefore occupy areas that are already disturbed. The remainder of the ROW would require clearing undisturbed areas that support desert tortoise habitat. The proposed substation would be outside the DWMA and the critical habitat area.

The State Water Board's preferred alternative transmission line route would occupy a total of about 28.7 acres of desert tortoise habitat, including 0.4 acre within the Chuckwalla Critical Habitat Unit. One line support structure would be located within the BLM DWMA, 3 structures within critical habitat, and 46 structures in other suitable habitat for desert tortoise. The majority of these structures would be adjacent to an existing transmission line.

Interior's preferred alternative transmission line route would place structures in proximity to lands managed for desert tortoise protection, occupying a total of 51.3 acres of desert tortoise habitat, including 21.5 acres within the DWMA and 12.4 acres within the Chuckwalla Critical Habitat Unit. Thirty-one line support structures would be placed in the DWMA and 18 structures within the Critical Habitat Unit. Therefore, the State Water Board's preferred alternative transmission line route would affect less desert tortoise habitat.

To reduce effects on desert tortoise, Eagle Crest would remove all tortoises from harm's way during the construction period (Measure DT-1) following conditions and guidelines in the Desert Tortoise Clearance and Relocation/Translocation Plan (discussed below). For linear facilities, Eagle Crest's biological monitors would first survey for all desert tortoises that might be within construction zones or are likely to enter construction zones, immediately prior to the start of construction. The biological monitors would

identify active burrows, and insert a 3-inch stick into the floor of the runway to monitor tortoise use (as tortoises enter or exit the burrow, the stick would be displaced and point in the direction of movement). Biological monitors would map the locations of all tortoises so that those locations could be monitored for tortoise use during construction.

Eagle Crest does not propose to conduct any activities within unfenced areas on the linear facilities without biological monitors present (Measure DT-2). This includes both construction monitoring and maintenance activities that require surface disturbance. Eagle Crest's designated staff, meeting FWS and California DFG certification requirements, would remove all tortoises following FWS and California DFG guidelines. Eagle Crest would avoid active burrows and special-resource burrows where possible. Where avoidance of any burrow is infeasible, biological monitors would determine occupancy through the use of fiber optics, probes, or mirrors. Monitors would then excavate the burrow with hand tools in the method prescribed by Desert Tortoise Council (1999), *Guidelines for Handling Desert Tortoises during Construction Projects*. Any tortoises found would be removed from the construction area. Along the water pipeline, Eagle Crest would close, cover, or fence trenches at the end of each day. Biological monitors would survey open trenches at first light, midday, and at the end of each day to ensure tortoise safety.

If necessary, Eagle Crest would install temporary fencing in the active work area to separate a tortoise from active construction to maximize protection. If a tortoise is injured or killed, Eagle Crest would cease all activities and contact Eagle Crest's designated staff. All injured tortoises would be taken to a qualified veterinarian. FWS would determine if the tortoise can be returned to the wild, if it recovers. Following site clearance, Eagle Crest's designated staff would prepare a report documenting the clearance surveys, construction monitoring, the capture and release locations of all tortoises found, individual tortoise data, and other relevant data. Eagle Crest would submit this report California DFG and FWS.

With the exception of the project switchyard, reservoirs, and brine pond, Eagle Crest would remove all desert tortoise fencing following completion of construction activities. The Desert Tortoise Clearance and Relocation/Translocation Plan includes provisions for tortoise surveys during construction that would identify "fence walking" and implement measures to reduce effects of temporary habitat fragmentation. Once complete, the transmission line and water pipeline would not contribute to habitat fragmentation because tortoise would be able to cross the access roads and project ROWs free of impedance.

Eagle Crest proposes to enclose the substation with a permanent tortoise exclusion fence to keep adjacent tortoises from entering the site. The fencing type would be 1- by 2-inch vertical mesh galvanized fence material, extending at least 2 feet above the ground and buried at least 1 foot. Where burial is impossible, the mesh would be bent at a right angle toward the outside of the fence and covered with dirt, rocks, or gravel to prevent the tortoise from digging under the fence. Eagle Crest would construct tortoise-proof

gates at site entry points. All fence construction would take place in the presence of biological monitors to ensure that no tortoises are harmed. Following installation, biological monitors would inspect the fencing monthly and during all major rainfall events and conduct any necessary repairs immediately. Such monitoring and maintenance would continue for the full term of the license.

Any areas in the central project area that are determined through surveys to require fencing would be fenced as outlined above. Where a fence is discontinuous (between tailings piles for example), the fence ends would extend well up the slope of the piles to ensure that tortoises cannot go around the end. Alternative methods may be explored to ensure that the fences are functional at excluding tortoises.

For both the central project area and the linear facilities, any necessary relocation of individual tortoises would require movement only to suitable habitat in the immediate vicinity (Measure DT-4). Following issuance of the draft EIS, Eagle Crest filed a revised Desert Tortoise Clearance and Relocation/Translocation Plan on March 14, 2011. This plan includes specific measures Eagle Crest would implement when relocating tortoises. These measures include:

- Descriptions of acceptable habitat where tortoises can be placed;
- Data to be collected from each capture/relocation event;
- Procedures for protecting tortoises encountered along roadways;
- Procedures for protecting tortoises encountered during periods with extreme high temperature (>43 degrees Celsius or 109°F);
- Approved methods for carrying tortoises; and
- Procedures for post-release monitoring.

Finally, Eagle Crest proposes to offset effects on tortoise habitat with the purchase of a minimum of 160 acres of suitable tortoise habitat for conservation purposes (Measure DT-6). Eagle Crest would purchase this land in the habitat range for the same population of desert tortoises that occupy the project area. Eagle Crest would use the following criteria to identify suitable parcels for purchase:

- Lands that are part of larger block of lands that are currently protected or able to be protected;
- Lands that are not subject to intensive habitat degradation (e.g., recreational use, grazing use, agriculture);
- Lands that have inherently moderate-to-good habitat that would naturally and ultimately regenerate when current disturbances are removed;
- Lands that are bordered by native habitat suitable for tortoises; and
- Lands that represent a buffer for a block of good habitat.

Our Analysis

As currently proposed, construction of the project would occur within both FWS-designated critical habitat and BLM DWMA. Additional habitat outside of these designated areas is also known to support this species. Therefore, construction of the project would be likely to affect desert tortoise through the removal and/or disturbance to occupied and protected habitat.

The State Water Board's preferred alternative transmission line route would be located adjacent to, but outside of the DWMA, and would cross only a small section of critical habitat immediately north of the substation. Additionally, the State Water Board's preferred alternative route would comply with the FWS' recommendation to co-locate the line with existing transmission lines, and, therefore, the State Water Board's preferred route would have lesser effects on desert tortoise.

Eagle Crest proposes measures that would provide multiple layers of protection from project effects including pre-construction surveys and clearance surveys to identify tortoises in unsafe locations, development of procedures for the safe relocation of these individuals, and development of measures to prevent tortoises from entering unsafe locations after they are cleared. These measures are consistent with FWS' recommended measures for handling desert tortoise (FWS, 2010b). Additionally, Eagle Crest would only allow designated employees who meet FWS standards to handle tortoises. Eagle Crest's proposed measures would substantially reduce the risk of project construction effects on desert tortoise. To increase consistency with FWS guidelines and provide additional clarity related to several measures, we revised the proposed Desert Tortoise Clearance and Relocation/Translocation Plan. Our revised version was issued with our final Biological Assessment on April 21, 2011. Our recommended modifications include the identification of recipient sites for desert tortoise relocations, specifying that all injured tortoises receive care from a qualified veterinarian, and stating that permanent exclusion fences would be maintained for the term of the license.

The NECO Plan states that all lands within a DWMA would be designated as Category I Desert Tortoise Habitat, with required compensation of 5 acres for every acre disturbed. All lands outside a DWMA are considered Category III habitat, with a 1:1 compensation ratio. Eagle Crest's proposed purchase of 160 acres of compensation lands is based on the proposed project disturbing 19 acres of Category I habitat and 65 acres of Category III habitat. However, construction of the project with the State Water Board's preferred alternative transmission line route, as we recommend, would result in different levels of disturbance to Category I and Category III habitat. The proposed Eagle Mountain Project is likely to affect desert tortoise habitat associated with the following project facilities: central project area (60.1 acres of Class III habitat); transmission line (0.48 acre of Class I/Critical Habitat Unit habitat; 28.2 acres of Class III habitat); water pipeline (22.9 acres of Class III habitat). Eagle Crest would revise these calculations following surveys in the central project area and final design engineering. As per the NECO Plan, Eagle Crest would acquire desert tortoise habitat at a 5:1 ratio for

disturbed lands in Category I/Critical Habitat Unit habitat and at a 1:1 ratio for disturbed lands in Category III habitat. Based on these calculations, Eagle Crest would acquire a minimum of 113.7 acres of desert tortoise compensation lands (0.48 x 5 + 111.8).

Effects of Operation on Desert Tortoise

Operation of the project would increase surface water availability to predatory species including ravens, gulls, and coyote. Additionally, the presence of the transmission line could provide additional perching and nesting area for predatory birds. By providing increases in these resources, the project could result in increases in the population size of these species in the vicinity of the project. Because these species are known to prey upon desert tortoise, such population increases could pose an increased risk of predation to this species and result in population reductions. Project maintenance activities would also pose a risk to the desert tortoise. These risks would depend on the specific activity required for project maintenance, but vehicle collisions would probably most likely. Finally, the proposed project would permanently occupy or disturb 144 acres of desert tortoise habitat, reducing habitat availability for this species. The State Water Board's preferred alternative transmission line route and substation location would occupy or disturb 88 acres of desert tortoise habitat.

Interior, in its March 12, 2010, letter, recommends that Eagle Crest relocate the transmission line out of desert tortoise critical habitat. Interior recommends Eagle Crest co-locate the new line with existing transmission lines near the project site to reduce the addition of new perching areas for predatory birds within the critical habitat area. FWS also comments that where the new transmission line could not be co-located with existing lines, the new line would result in increased perching and nesting structure for desert tortoise predators. FWS recommends Eagle Crest avoid creating such an environment where predation rates on desert tortoise could increase.

The Park Service filed comments on the final license application on March 11, 2010. In this filing, the Park Service comments that Eagle Crest's management of desert tortoise predators should not be limited to ravens but should also include coyotes, wild dogs, gulls, and other potential predators.

In response to this comment, Eagle Crest notes that the project reservoirs would not be the only water source in the area and that existing sources, including the Colorado River Aqueduct, Metropolitan Water District's pumping plant reservoir, wastewater treatment ponds, and agricultural irrigation systems, also would subsidize predator species. Eagle Crest contends that since water is constantly available from these sources, water supply is not a limiting factor for predator species population size in the project vicinity.

To reduce the potential for project operations to result in increased predation on desert tortoise, Eagle Crest developed a Predator Monitoring and Control Plan. In response to the Commission's AIR, Eagle Crest filed a completed draft of this plan on March 11, 2011. Specific components of the plan include the following:

- Identifying specific project components with potential to attract ravens;
- Conducting raven surveys, using 10-minute point counts and vehicular/pedestrian surveys, searching all Joshua trees, landscape trees, utility poles, transmission towers, and human-made structures within the survey area, during project design (years 1 to 2) to determine baseline, pre-construction conditions of raven populations on project lands and within 1 kilometer of the proposed project boundary;
- Recording incidental observations of coyotes, dogs, and gulls during raven surveys;
- Conducting post-construction monitoring to detect changes in raven population size, nesting behavior, or evidence of tortoise predation (including initiation of post-construction surveys during the second year after project completion, followed by surveys once every 5 years for the duration of the license);
- Development of a trash and food waste management program;
- Hazing measures at project reservoirs and desalination ponds;
- Procedures for removing raven nests, if determined necessary through consultation with FWS;
- Procedures for reporting study results to management agencies; and
- Thresholds for success or need for additional control measures.

Finally, during project maintenance activities where ground disturbance would occur, Eagle Crest would ensure qualified biological monitors are present. These monitors would use methods and procedures described above to protect desert tortoise.

In its comments on the draft EIS, FWS states that a survey frequency of once every 5 years for raven surveys does not provide many opportunities for adaptive management. FWS recommends more frequent surveys, particularly in early years of the license.

Our Analysis

Operation of the project would increase available water sources for desert tortoise predators. The completed transmission line would provide additional perching and nesting locations for ravens and other predatory birds. However, since neither of these resources appear to be limiting factors (both are readily available in the project vicinity), the extent to which these additional resources would support increases in predator populations is not clearly evident. On the other hand, without successful implementation of mitigation for these effects, there is potential for adverse effects on the desert tortoise.

Eagle Crest's proposed measures include surveys to determine base line conditions for raven populations in the project area; and, a plan for follow up surveys to quantify the effects of project facilities on raven population size. Eagle Crests proposal to include

gulls in the raven surveys is appropriate because the survey methods are typical for avian surveys. Additionally, since gulls have not been recorded in the study area, limited survey effort is required to detect an increased presence of this species. However, although Eagle Crest notes that these surveys would also detect increases in coyote or wild dog (canine) populations, the mechanism for such detections limited in detail and has low probability of providing an accurate assessment of changes in activity for these species. Further, the proposed methods do not include any mechanism for evaluating canine predation on the desert tortoise.

Surveys for large mammal activity are more commonly conducted using traps, scent stations, baited track plates, and/or motion sensing photography (Manley et al., 2006; Zielinski and Kucera, 1995). While such methods would not provide for an accurate estimate of population size or population density, these methods would provide data to analyze relative changes in activity levels in the project area. Estimates of relative levels of canine predation on desert tortoise could be based on transect surveys looking for excavated burrows or tortoise carcasses with evidence of bites or scratches. These surveys could be concentrated within the desert bajadas east of the central project area where, based on soil conditions, such activities are more likely to occur (Esque et al., 2010). These surveys, paired with baited track plates and motion sensing cameras, would provide better data to assess potential project related increases in canine predation on desert tortoise.

Additionally, Eagle Crest's proposed 5-year monitoring period would not provide many opportunities for adaptive management. There is potential for predator populations to respond slowly, with effects on desert tortoise not evident until 2 to 3 years following initiation of project filling and operation. Failing to detect these changes until 5 or 10 years later would increase effects on the desert tortoise. More frequent surveys during the early years of the project could detect increases in predators following initiation of project activities, resulting in a more timely implementation of predator control measures, thereby reducing potential effects on this species.

A 5-year monitoring period may not provide many opportunities for adaptive management; more frequent surveys during the early years of the project would be more appropriate. Two years of preconstruction baseline surveys, annual surveys during construction, and post-construction surveys in years 1–5, 7, and 10 to be commenced the first year reservoir filling is initiated could be more appropriate. Upon the conclusion of each survey, Eagle Crest could file a report of results, conclusions, and any recommended mitigation measures. The report could be provided for agency comment and could require agency consultation to develop mitigation if surveys show increases in predator activity and desert tortoise predation.

Following the year 10 post-reservoir filling, we expect predator populations would be in equilibrium with the additional water source. If the surveys do not indicate any substantial increase in predator activity and desert tortoise predation, surveys could be discontinued. If survey results indicate there are increases in predator activity and desert

tortoise predation, or have indicated a need for additional mitigation measures to control predator populations, surveys could continue for the term of the license on a schedule developed in consultation with resource agencies and approved by the Commission.

The proposed transmission line would result in the creation of a new utility corridor removed from pre-existing transmission lines. Under these conditions, the transmission line structures would likely provide suitable perching and nesting habitat for ravens, potentially increasing predation risk to desert tortoise. Conversely, the State Water Board's preferred alternative transmission line route would parallel an existing 160-kV line supported with wooden H-frame structures.

Any reasonable efforts Eagle Crest can make to locate the transmission line outside of desert tortoise critical habitat and co-locate with other transmission lines would be beneficial. Co-locating lines near existing lines would still add potential perching and nesting habitat; however, the quality of this habitat would be lower than habitat created by adding new structures to areas where transmission lines are not already present. This reduction in quality is related to territorial behavior in ravens. New towers built away from existing nesting habitat would increase the number of potential raven nest sites because the new nest sites would be outside of any pre-existing territories. Constructing a new transmission line adjacent to an existing line would not add to the number of potential nest sites in the corridor.

On the other hand, Eagle Crest's proposed lattice structures would provide better nesting opportunities than the existing H-frame structures associated with the 161-kV line. The lattice structures would provide additional shade and the angles of the lattice design provide favorable locations for nest support. Locating the line adjacent to the existing 161-kV transmission line would be better than locating the new line within a new transmission ROW. But the lattice structures would still increase nest habitat quality within the existing utility corridor over existing conditions. If Eagle Crest were to use monopole structures instead of lattice structures, increases in nesting quality would be limited.

Implementation of the Revegetation Plan and Invasive Species Monitoring and Control Plan would provide beneficial effects on desert tortoise by restoring and maintaining habitat. However, these actions also pose a threat to desert tortoise due to potential use of herbicides, motorized vehicles, and excavation equipment. If Eagle Crest stipulates that all project-related activities within desert tortoise habitat, including revegetation, invasive species management, any additional surveys for sensitive species, or any other actions with potential to affect desert tortoise, would take place following the guidelines and procedures in the WEAP and Desert Tortoise Clearance and Relocation/Translocation Plan, potential effects on this species would be reduced.

Eagle Crest's proposed WEAP, Desert Tortoise Clearance and Relocation/Translocation Plan, Predator Monitoring and Control Plan, and proposed compensation for disturbance to desert tortoise habitat would reduce potential effects of construction and operation of the project on desert tortoise. However, surveys have

shown the project area to support a population of desert tortoise, with multiple live tortoises, tortoise scat, and tortoise remains observed along proposed project features. As such, it is likely encounters between desert tortoise and construction and/or maintenance crews would occur. These encounters would likely result in the need to handle tortoises for removal to other areas and disturbance to or destruction of tortoise habitat. Such interactions, even when conducted following FWS guidelines and with the best of intentions, would increase stress and potentially result in desert tortoise mortality. Additionally, permanent effects would occur within the Chuckwalla Unit of designated critical habitat. Therefore, we find the proposed project may adversely affect the desert tortoise and adversely modify the Chuckwalla Unit of critical habitat for desert tortoise.

3.3.4.3 Cumulative Effects

The proposed project would not affect Coachella Valley milkvetch and would not contribute to any cumulative effects on this species in combination with other foreseeable actions in the vicinity.

Construction and operation of the pumped storage project, the Eagle Mountain landfill, and multiple solar projects proposed in the Chuckwalla Valley all have the potential to affect desert tortoise. These effects include both direct disturbance and removal of suitable habitat. Both the proposed project and the Eagle Mountain landfill (if constructed; see *Land Use* in section 3.3.2) would occupy lands in the central project area. Construction and operation of these projects could disturb bighorn sheep by increasing noise and human presence in the area. Combined, these projects are expected to occupy 6,875 acres, 47 percent of which would be associated with the pumped storage project. Construction of the two projects is not expected to occur simultaneously, so there would not be cumulative effects of construction at one time. However, construction of both projects could result in prolonged increases in human presence and vehicular traffic in the project area. Both projects also have potential to subsidize desert tortoise predators.

Construction activities are expected to involve about 75 trucks per month for the project and 1,500 trucks per month for the landfill. Eagle Crest does not propose to develop new access roads or conduct any road improvements within the central project area. For the landfill, Kaiser would construct 6 miles of new, paved access roads, and widen an additional 6 miles of existing road. During operation, Eagle Crest expects to require 2 truck trips per day, while the landfill operations would require between 50 to 100 trucks per day depending on the age of the project. Eagle Crest's estimate of 75 trucks per month seems low for the amount of materials needed for the proposed project. However, even if this number is increased by a factor of 10, the contribution of the proposed project to total stress associated with construction noise would be small compared to that associated with construction of the landfill.

Both the proposed project and the Desert Sunlight Solar Farm Project (BLM, 2010a) would require construction of new transmission lines to interconnect with the electric grid. The Desert Sunlight Solar Farm Project would entail constructing the Red Bluff substation about 6 miles east of Desert Center along the Interstate 10 corridor and a new 230-kV transmission line that would parallel the existing SCE 160-kV transmission line. The State Water Board's preferred alternative transmission line route for the project would use the same substation and transmission corridor for both the Eagle Mountain and Desert Sunlight Solar Farm projects, consistent with the California Public Utilities Commission's environmentally preferred alternative for the Desert Sunlight Solar Farm Project (BLM, 2010a).

The Eagle Mountain landfill would increase available food sources associated with the importation of waste to the central project area. The closest similar type of food subsidies for ravens is at the Desert Center sanitary landfill. The Eagle Mountain landfill proposes multiple mitigation measures to prevent ravens from accessing waste. These measures would include hourly burial of waste deposits, removal of potential perching areas, and experimental treatments with additions of chemical deterrents. The landfill would also monitor raven populations. If both projects are constructed, the combined effects of increased food sources would likely create conditions suitable for expansion of the raven populations. While transmission lines and water sources are already present in the project vicinity, there is potential for the combination of water subsidies co-located with food subsidies to result in cumulative effects on raven populations. However, Eagle Crest's proposed measures to study effects of the project on ravens and other desert tortoise predators and implement control measures as needed would ensure the collective effects on ravens with the landfill project are not substantially greater than the effects of the proposed landfill and solar facilities alone.

Currently, 11 solar projects, totaling about 123,600 (plus or minus 35,000) acres, are proposed in the Chuckwalla Valley. There is little certainty as to how many of these projects will be constructed. Similarly, it is not possible to ascertain the acreage of suitable desert tortoise habitat these projects would occupy. However, compared to the scale of these potential projects, the effects of the project on desert tortoise habitat in the Chuckwalla Valley (about 88.3 acres) would be negligible.

Both the proposed project and the Desert Sunlight Solar Farm Project (BLM, 2010a) would require construction of new transmission lines to interconnect with the electric grid. The Desert Sunlight Solar Farm Project would entail constructing the Red Bluff substation about 6 miles east of Desert Center along the Interstate 10 corridor and a new 230-kV transmission line that would parallel the existing SCE 160-kV transmission line. The State Water Board's preferred alternative transmission line route for the project would use the same substation and transmission corridor for both the Eagle Mountain and Desert Sunlight Solar Farm projects, consistent with the California Public Utilities Commission's environmentally preferred alternative for the Desert Sunlight Solar Farm Project (BLM, 2010a).

Eagle Crest's proposed monitoring and mitigation measures would ensure the project does not contribute to adverse cumulative effects on the desert tortoise. Co-locating project facilities with the Desert Sunlight Solar Farm Project, as the State Water Board prefers, would also reduce cumulative effects on desert tortoise.

3.3.5 Recreation, Land Use, and Aesthetics

3.3.5.1 Affected Environment

Regional Recreation Resources

Recreational resources in the region are primarily provided and managed by the Park Service and BLM and include some resources on lands owned by the state of California. Activities within the region include hiking, camping, backpacking, hunting, scenic/wildlife viewing, rock hounding, rock climbing, mountain biking, horseback riding, and OHV use.

Joshua Tree National Park and Wilderness Area

The JTNP is the most visited public land for recreational resources in the project vicinity. The JTNP encompasses nearly 792,000 acres of land, of which 585,000 acres have been designated wilderness under the Wilderness Protection Act of 1964 (Park Service, 2010a). This 585,000-acre wilderness area surrounds the central project area on three sides (figure 15). At its closest point, the park boundary is located about 1.5 miles from the proposed project site within the largely inactive Eagle Mountain mine. The Park Service manages the JTNP, and there are trails that provide for motorized and non-motorized forms of access. No existing or proposed project features are located inside the park or wilderness area.

Access to the JTNP is from Interstate 10 to the south and from State Route 62 to the north. The JTNP offers a variety of dispersed recreational activities and camping. Due to its unique geology and rock formations, this area is internationally known as a prime rock climbing destination. Massive boulders and rock outcrops provide some of the best rock climbing in the United States. Skilled and novice technical rock climbers from around the world are attracted to the challenging climbing routes (BLM and California DFG, 2002). The JTNP continues to be a popular destination for both local and non-local residents and has increased visitation steadily over the past several years, such that it is now considered a year-round destination. The wilderness area provides an opportunity for solitude in nature and for primitive recreation such as hiking, backpacking, and horseback riding. Opportunities abound for viewing, studying, and photographing a diversity of flora and fauna.

Developed recreational facilities, including trails, camping, picnic, and day-use facilities, are more prevalent in the northwestern portion of the JTNP. In keeping with the management prescriptions of the wilderness area designation, recreational facilities in this segment of the park include a few backcountry roads and trails. Cottonwood Visitors

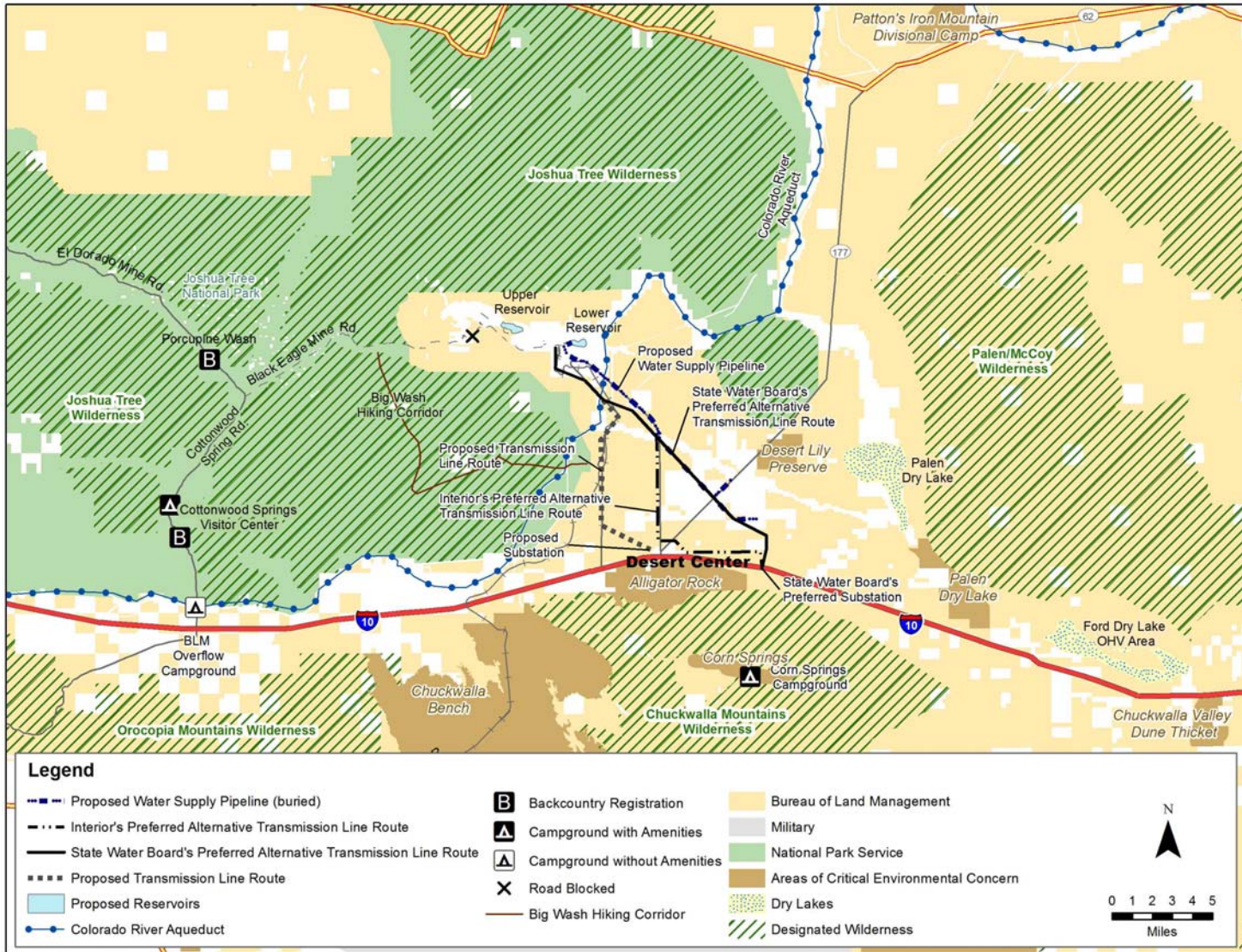


Figure 15. Recreation resources in the vicinity of the proposed project (Source: Eagle Crest, 2009a, as modified by staff).

Center greets visitors at the southern access road to the JTNP, while the northern portion is accessible from the Oasis Visitor Center near Twentynine Palms, and the West Entrance Station south of the town of Joshua Tree. All but one of the nine campgrounds within the JTNP are located in the western half of the park.

Backcountry hiking and camping are popular in the park. Trails and facilities are more limited in the eastern half nearest the proposed project area; however, this area of the JTNP is home to more than 30 abandoned mines, an attraction to some visitors. One backcountry unpaved road, Black Eagle Mine Road, traverses canyon areas within the park and exits toward the proposed project area. The Big Wash Hiking Corridor is a Park Service trail within JTNP that follows the Big Wash arroyo from Victory Pass just south of the Metropolitan Water District's pumping plant, west into JTNP and gradually turning northwest, terminating at Black Eagle Mine Road about 2 miles west of the eastern park boundary.

The JTNP Backcountry and Wilderness Plan (Park Service, 2001) identifies an overnight restriction area (day-use only) within the wilderness area, bordering the park boundary, and about 2 miles due south of the proposed reservoirs site. There are no roads, trails, or trail corridors identified in the plan that indicate there is access to this day use only area at the present time or planned for the future.

Bureau of Land Management

The majority of recreational opportunities on BLM lands includes hiking and OHV use. BLM maintains an inventory of trails and areas open or closed to OHV activity. BLM also maintains several primitive campsites within the region.

Existing Recreation Resources in the Proposed Project Vicinity

Recreational resources in the project area are primarily dispersed opportunities on public lands; however, there are a small number of developed amenities. Public lands in the vicinity of the Interstate 10 corridor and Chuckwalla Valley include Ford Dry Lake and Palen Dry Lake, which are managed by BLM. Additionally, BLM manages the Chuckwalla Valley Dune Thicket and Alligator Rock, both Areas of Critical Environmental Concern (ACEC) located near Interstate 10. These areas are designated for the protection of wildlife and other resources. The Desert Lily Sanctuary is a 2,040-acre preserve adjacent to State Route 177 about 8 miles southeast of the proposed reservoir site. In addition to the JTNP and wilderness area, other designated wilderness areas in the vicinity include the BLM-managed Chuckwalla Mountains wilderness area south of Interstate 10 outside Desert Center; the Palen/McCoy wilderness area east of State Route 177; and the Orocopia Mountains wilderness area southwest of Desert Center. There are no developed facilities at any of these locations other than gravel parking and signage at the Desert Lily Sanctuary. BLM allows overnight (overflow) camping on a gravel lot north of Interstate 10 just outside the south entrance to JTNP.

Developed recreational facilities in the area include a museum, golf course, and campground. The General Patton Museum is located just off Interstate 10 at Chiraco Summit. This facility also borders a large historic area known as Camp Young, which was established as a desert warfare practice area during World War II. The small community of Lake Tamarisk, located about 5 miles southeast of the proposed project area, has a 9-hole golf course (see figure 16). BLM operates the only developed campground outside JTNP in the vicinity of the proposed project, Corn Springs in the Chuckwalla Mountains Wilderness, about 7 miles south of Desert Center. A private business has developed the Desert Center Airport off State Route 177 east of Lake Tamarisk into a motorsport facility that is currently being used as a race car driving school and site where racers can test drive their modified vehicles. According to the developer's web site, they are currently looking for investors to develop grandstands, clubhouses, and other motorsport-related facilities.

Visitation

The majority of recreation activity in the region occurs within the JTNP. The park, received almost 1.4 million visitors in 2008, with 3,895 recorded backcountry stays (2010b). Most of the park's developed facilities lie to the west of the main, paved park road, with the exception of Cottonwood Springs Visitor Center and its associated facilities. Recreation facilities on the east side of the park are minimal and, as such, recreation use on the east side of the park is relatively sparse, as is information about the number of users in this portion of the park. The JTNP Management Plan notes that only about 0.5 percent of visitors to the park spend the night in the back country (Park Service, 2001). The backcountry wilderness registration board closest to the proposed project is located at Porcupine Wash on Pinto Basin Road just west of the intersection of Black Eagle Mine Road and Old Dale Road. Miscellaneous backcountry use in the southeastern portion of the park over the past 5 years has ranged from between 3,900 to 5,900 user-nights annually (Eagle Crest, 2009c). About 500 of these user-nights are estimated to be attributed to the eastern region of the Park (Eagle Crest, 2009c).

Day use of the east side JTNP lands prior to its inclusion into the park/wilderness system in 1994 relied on 4-wheel drive access to many locations (Park Service, 2001). Four-wheel drive/OHV use is prohibited within wilderness areas. Black Eagle Mine Road, an unmaintained dirt road, traverses a non-wilderness corridor in this eastern section of the park, and continues beyond the park boundary to the Eagle Mountain mine and proposed project site. The park allows only road-licensed 4-wheel drive vehicles to access this road, and it is used by both locals and tourists; however, the Park Service does not maintain vehicle counters along the road. Based on its experience, Park Service staff estimated that the road may see about 1,000 day-use visits in a season (Eagle Crest, 2009c). The Black Eagle Mine Road is barricaded with a large boulder in the middle of the road about 3 miles east of the JTNP boundary. The road block is positioned at the apex of the saddle of the Eagle Mountains running north-south, precluding vehicular

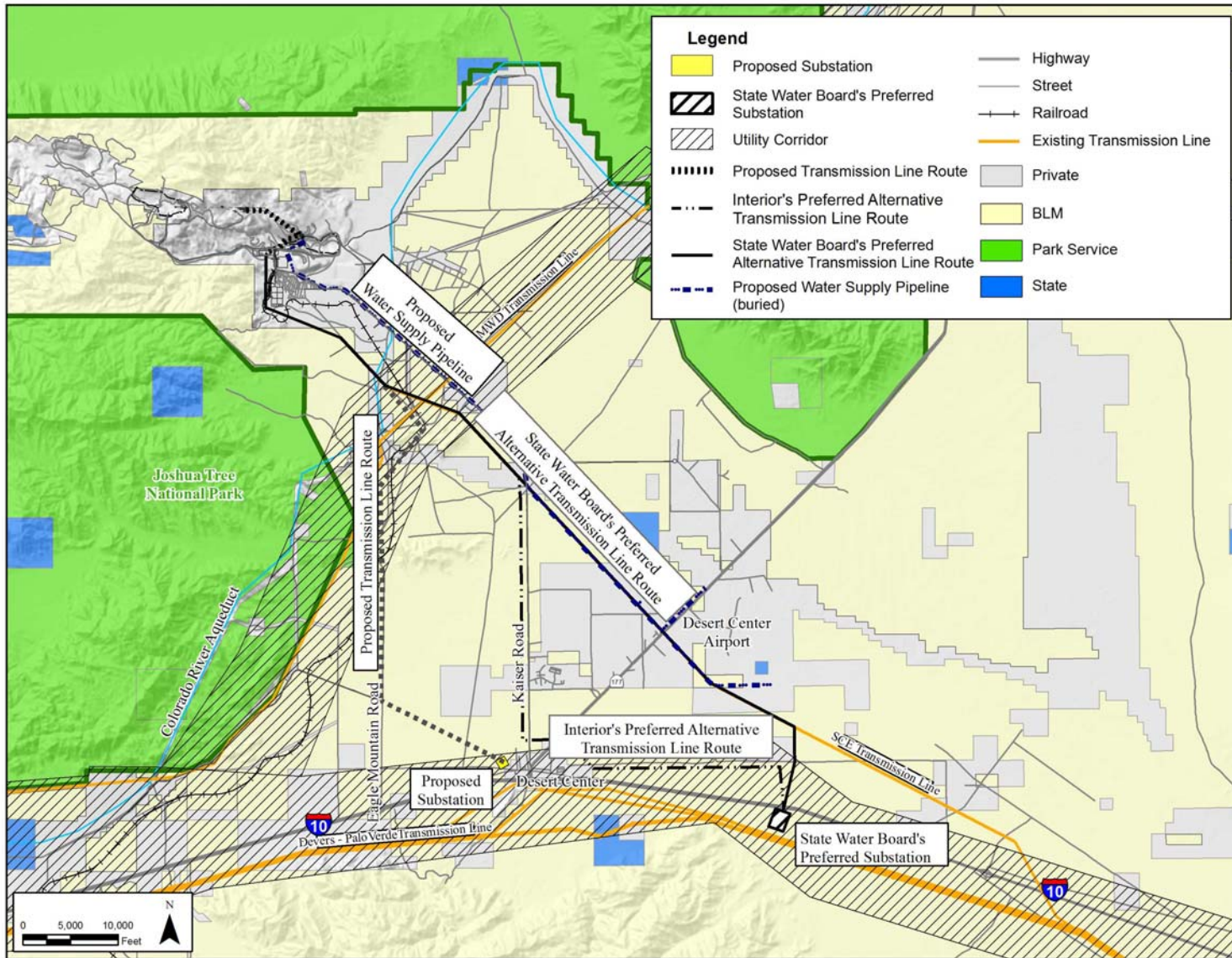


Figure 16. Land ownership in the vicinity of the proposed project (Source: Eagle Crest, 2009a, as modified by staff).

access between the park and the Eagle Mountain mine site. About 5 to 10 abandoned mines are located short distances off of Black Eagle Mine Road along the route within the JTNP boundary.

Outside of JTNP, OHV use is the primary dispersed recreational activity in the area. OHV use has long been a major part of the recreation in the area, and, nationally, OHV use has increased five-fold in the last 3 years (BLM, 2010b). As noted previously, BLM maintains an inventory of trails that indicates areas open or closed to OHV activity. There are no BLM OHV areas designated as “open” within Riverside County, where riding off designated routes is permitted. All BLM lands throughout the region are designated “limited use” for OHV purposes, meaning that all vehicles must remain on designated routes of travel. There are no estimates of the amount of recreational use these lands receive.

Similarly, BLM does not keep records of visitor use at the few camping areas in the vicinity (e.g., Corn Springs campground, JTNP dispersed camping overflow area, general dispersed camping). BLM has noted as part of the review of the NECO Plan that this area receives little recreational use (Eagle Crest, 2009a).

Land Use

Land Use in the Project Area

Much of the land surrounding the Eagle Mountain mine is public land managed primarily by the Park Service and BLM. Communities in the vicinity of the proposed project include the town of Eagle Mountain, Lake Tamarisk, and Desert Center. Kaiser developed the town of Eagle Mountain, which is located adjacent to the Eagle Mountain mine, to house mine workers. The town site consists of about 250 single-family dwellings, a store, café, two churches, a school, and a post office among other features. After the mine closed in 1986, the town became largely vacant; however, a few Kaiser employees maintain residences there and the school is still in use. California Department of Corrections contracted with private prison operators to house low-risk inmates in renovated facilities that occupied the old town shopping center between 1986 until its closing in 2003. The correctional facility included housing units in four pods. When operated as a state facility, the rated capacity was 436 minimum security beds. Riverside County board members studied the site as a potential county correctional facility; however, the 2007 feasibility study (DMJM Design/AECOM, 2007) recommended the County should not pursue this as an option.

The California State Lands Commission holds a 100 percent reserved mineral interest in a 467-acre parcel of land within the east and central mine pits. Kaiser leased 145 acres of these lands until 2002, when the lease expired.

Lake Tamarisk and Desert Center are located about 9 and 10 miles southeast of the Eagle Mountain mine, respectively. Both towns are small communities with fewer than

100 single-family dwellings combined. Both communities as well as Eagle Mountain are accessed by Kaiser Road, which connects to Interstate 10 at Desert Center.

Land Use Within and Adjacent to the Proposed Project Boundary

Reservoir and Construction Laydown Areas—The site consists of mountainous, rocky terrain that has been extensively disturbed as a result of past mining activity. Inactive open pits, tailings piles, and remnant tailings ponds exist on site. Remnants of the structures associated with the previous mining, including railhead, haul roads, and ore processing/refining facilities, still exist, although most of the ore processing and refining facilities have been removed.

The central project area occupies only a portion of the acreage encompassing the Eagle Mountain mine area. Kaiser has proposed to develop much of the area between the two open mine pits proposed as the upper and lower reservoirs for this project as a landfill.⁵⁷ As part of the landfill proposal, BLM would exchange about 3,500 acres of public land within the area for offsite private lands to support the landfill project in the mine area. Figure 17 provides the phasing and layout of the proposed landfill project. If the land exchange were not to be consummated, the project boundary for the proposed project would include nearly 1,059 acres of federal land managed by BLM. If the land exchange is executed, 676 acres of the proposed project features would be on federal lands. However, the land exchange is the subject of ongoing litigation. The California State Lands Commission holds a 100 percent mineral interest on 467 acres surrounding the proposed lower reservoir site.

Water Pipeline Corridor—Water for the proposed project would originate from three wells in the Chuckwalla Valley about 11 miles from the proposed reservoirs. Water from the wells would be conveyed to the lower reservoir via pipeline extending alongside existing roads and a Metropolitan Water District transmission line corridor within a proposed 60-foot-wide pipeline ROW.

Land uses adjacent to the corridor consist primarily of undeveloped desert land. The southern third of the proposed route would cross several private parcels with inactive agricultural fields. The remainder of the route would consist of undeveloped federal land managed by BLM. As the proposed route approaches the Eagle Mountain area, it would cross the Colorado River Aqueduct and surrounding Metropolitan Water District lands and easement areas before reaching the lower reservoir (figure 16).

⁵⁷ The Eagle Mountain landfill is proposed to be constructed in five phases, with each phase designed to accommodate about 100 to 200 million tons of refuse. Construction and operation of each phase of the landfill is designed to progress generally from west to east. Development within each phase would occur in sub-phases and progress from south to north. The landfill build-out (i.e., 2,164 acres) is estimated to occur about 100 years after start up (CH2M HILL, 1996).

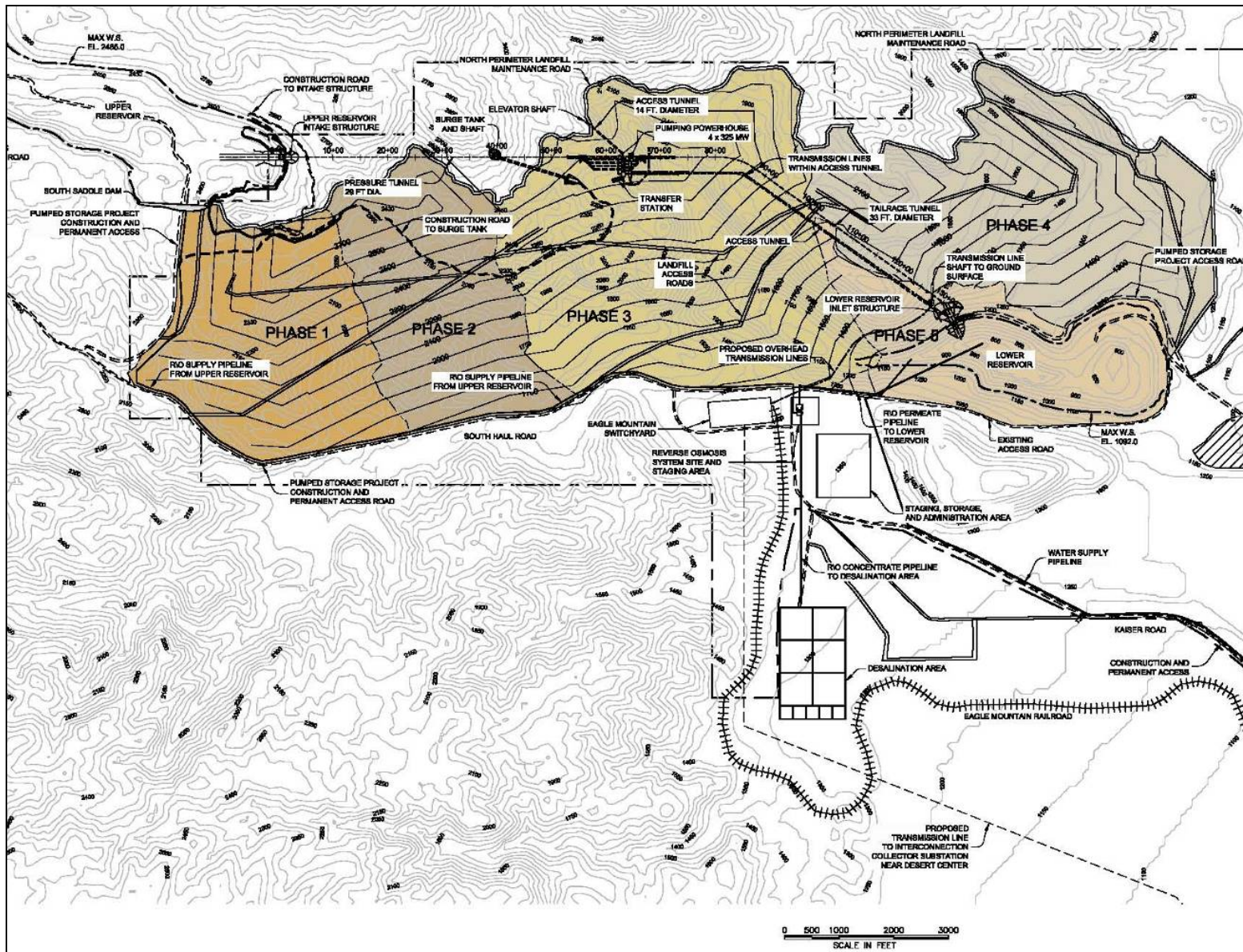


Figure 17. Proposed phasing of the landfill project (Source: Eagle Crest, 2009a, as modified by staff).

Transmission Line Corridor—The proposed route for the project’s double-circuit 500-kV transmission line would be located almost entirely on public lands managed by BLM. Exceptions include private lands within the proposed project boundary owned by Kaiser and a small crossing of land owned by the Metropolitan Water District as the route crosses the existing district’s aqueduct and transmission lines. Eagle Mountain proposes a 200-foot-wide corridor for construction, operation, and maintenance of the proposed transmission line. The proposed route would extend about 13.5 miles from the proposed project switchyard south-southeast to a proposed interconnection collector substation that would interconnect with the proposed Devers-Palo Verde No. 2 transmission line located near Desert Center.

The transmission line would exit the project switchyard and extend south to a point on the west side of the Eagle Mountain rail line. At this point, the route turns southeast to a location adjacent to existing SCE 161-kV wood pole transmission lines. Here, the line would turn to parallel the existing transmission lines and access road, crossing the Metropolitan Water District’s metal tower electric transmission structures and passing to the east of the Metropolitan Water District’s pumping plant. Most of this route segment from the mine to the Metropolitan Water District’s pumping plant would be located on public land managed by BLM, except for a small parcel of land around the Colorado River Aqueduct and Aqueduct Road owned by Metropolitan Water District. This area of the proposed transmission line is undeveloped except for a number of unpaved access roads, the paved Aqueduct Road, and existing transmission lines.

East of the Metropolitan Water District’s pumping plant, the transmission line route would cross over a pass in the small hills near the Eagle Mountain railroad. At this point, the route would turn southwest for a short distance before turning south to parallel the existing Eagle Mountain Road. The route would continue to parallel Eagle Mountain Road for about 3 miles, then turn southeast and continue for another 2.5 miles to the proposed substation. Land use in the location of the proposed substation is undeveloped desert; rural open space as designated in the County’s General Plan. South of the proposed substation, low density residential development exists as a part of Desert Center.

Plans

BLM is the primary land manager in the region. The entire proposed project area is located within the 25-million acre California Desert Conservation Area (CDCA), of which about 12 million acres are public lands. The California Desert Conservation Area Plan (BLM, 1980) is the BLM’s land use plan for the CDCA. The general goal of the CDCA Plan is to provide for the use and protection of the desert’s natural, cultural, and aesthetic resources. This plan specifies that activities on BLM-managed public lands must conform with the approved land use.

Public lands under BLM management within the CDCA have been designated geographically into four Multiple Use Classes. The majority of the proposed project site

itself is not designated because it is largely or entirely private land and therefore not directly under BLM stewardship. The plan does provide Multiple Use Class designations for portions of the proposed project site and directly adjacent public land. Public lands are assigned a Multiple Use Class according to the following allowable level of multiple uses.

- Class “C” (controlled use) designation is the most restrictive, and is assigned to wilderness areas;
- Class “L” (limited use) lands are managed to provide lower intensity, carefully controlled multiple uses while ensuring that sensitive resource values are not significantly diminished;
- Class “M” (moderate use) lands are managed to provide for a wider variety of uses such as mining, livestock grazing, recreation, utilities, and energy development, while conserving desert resources and mitigating damages that permitted uses may cause; and
- Class “I” (intensive use) provides for concentrated uses of lands and resources to meet human needs (BLM and California DFG, 2002).

The proposed reservoirs and surrounding area are included within one of six concurrent CDCA Plan amendments—the NECO Plan, a plan developed for a geographic subset of the larger CDCA. Public lands west of the Kaiser lands but east of the JTNP boundary are managed as Multiple Use Class-L, and public lands east of the Eagle Mountain mine are managed according to Multiple Use Class-M guidelines.

The CDCA Plan identifies designated utility corridors targeted for transmission lines, pipelines, and related structures such as substations and compression stations and indicates that applications for utility ROWs will be encouraged by BLM management to use designated corridors (BLM, 1980). The plan states that sites associated with power generation or transmission not identified in the CDCA Plan will be considered through the plan amendment process (BLM, 1980).

Routes within defined corridors and on BLM-managed lands require authorization of a ROW grant from BLM. Figure 16 identifies the current BLM Multiple Use Classes relative to the project and the CDCA Plan utility corridors.

Riverside County—The project study area lies within Riverside County’s Desert Center Land Use Planning Area. The vast majority of the planning area is classified as Rural Open Space and zoned as Natural Assets. Within the Desert Center Land Use Planning Area, Riverside County has established two specific policy areas. Policy areas are specific geographic districts that contain unique characteristics that merit detailed attention and focused policies. The Eagle Mountain policy area encompasses the proposed project site and the Eagle Mountain town site. Outside this specific policy area boundary, “Rural Open Space” dominates the county land use designation, with the exception of an area of “Rural Open Space-Mineral Resources” to the north/northwest of

the proposed reservoirs area. Riverside County zoning and land use plans identify the Eagle Mountain mine site as a landfill site.⁵⁸

The Desert Center policy area encompasses currently undeveloped land located adjacent to and north of the small, unincorporated community of Desert Center. The terminus of the proposed transmission line and substation would be included within this policy area.

Joshua Tree National Park—The JTNP was established first as a national monument in 1936 and later changed to a National Park in 1994. As noted previously, the Eagle Mountain wilderness area is within the park boundary. The closest part of the JTNP is located about 1.5 miles from the proposed project area and is designated by the Park Service as backcountry transition or wilderness subzones. Lands within the backcountry transition subzone are managed to maintain the natural resources and processes that are unaltered by human activity except for approved developments essential for use and appreciation such as park roads, picnic areas, and backcountry parking areas. This designation applies to the Black Eagle Mine Road corridor. The remainder of the area outside the road corridor is designated as a wilderness subzone, and no development is allowed. The wilderness area designation allows only non-motorized, non-mechanized activities to occur within its boundaries, with minimal trail creation and maintenance.

Aesthetics

The proposed project is located about 10 miles north of Desert Center, California, less than 60 miles from the Colorado River. This area of California is generally referred to as the western Sonoran Desert, or more commonly called the “Colorado Desert,” and includes the area between the Colorado River Basin and the Coast Ranges south of the Little San Bernardino Mountains and the Mojave Desert. The overall character of the area is a combination of arid and semi-arid landscapes alternating between basins and mountain ranges. Local elevations range from about 400 to 2,500 feet, while regionally

⁵⁸ Specific Plan 305 was approved on September 8, 1997 (Riverside County, 1997). Specific plans are for land use for the development of large property holdings, which are otherwise eligible for development under the Riverside County General Plan. Specific Plan Zone will be applied only to property for which a specific plan of land use has been adopted; provided, however, that the Specific Plan Zone may be adopted concurrently with a specific plan. The zone will be applied only upon a finding that the specific plan of land use contains definitive development standards and requirements relating to land use, density, lot size and shape, siting of buildings, setbacks, circulation, drainage, landscaping, architecture, water, sewer, public facilities, grading, maintenance, open space, parking, and other elements deemed necessary for the proper development of the property.

the San Bernardino Mountains 100 miles west of the area rise up to about 11,500 feet and the Salton Sea, about 50 miles southwest of the area, is 227 feet below sea level.

The proposed project components would be located in an area that is visually characterized by broad, flat desert valleys bordered by highly eroded mountain ranges. The arid environment and low lying, sparse vegetation provide long views across the desert landscape from key viewpoints. One of the visually striking features of this area is how abruptly the mountains rise above the valley. The proposed project would be located within a largely inactive iron-ore mine site within the Eagle Mountains with the transmission and water pipelines running across the Chuckwalla Valley. The valley is a mostly flat desert bordered by the Eagle Mountains to the west, the Coxcomb Mountains to the north east, and the Chuckwalla Mountains to the south. The small communities of Lake Tamarisk and Desert Center are located within this valley near Interstate 10 about 9 and 10 miles, respectively, south of the largely inactive mine.

BLM Visual Resource Management System

The BLM's Visual Resource Management (VRM) system is a management tool to assist BLM in carrying out its mandate to ensure that the scenic values of the public lands are considered before allowing uses that may have negative visual effects. The VRM system involves inventorying scenic values and establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to determine whether they conform with management objectives.

The visual resource inventory (VRI) process provides BLM managers with a means for determining visual values. The inventory consists of a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones. Based on these three factors, BLM-administered lands are placed into one of four VRI classes. These inventory classes represent the relative value of the visual resources. Classes I and II represent the most valued resources, Class III represents a moderate value, and Class IV represents resources of least value.

VRM classes are categories assigned to public lands and serve two purposes: (1) an inventory tool that portrays the relative value of the visual resources, and (2) a management tool that portrays the visual management objectives. The VRM system evaluates the quality of existing scenery by accounting for the distance from which scenery is viewed and peoples' sensitivity to changes in the landscape. According to the VRM system, resource management classes comprise the following objectives:

- 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. ACECs are classified as VRM Class I.
- 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 that 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 effect of these activities through careful location, minimal disturbance, and repeating the basic elements.

BLM and DOE have identified lands within the Chuckwalla Valley or Eagle Mountain areas as VRI classes II and III (BLM and DOE, 2010). The VRI classes for lands surrounding the proposed project are VRI Class II, indicating high relative visual values, and Class III, indicating moderate relative visual values. Within the project area, VRI Class II areas include lands adjacent to JTNP and the western half of the Chuckwalla Valley (not including the central mine area). VRI Class III areas include the Eagle Mountain mine and along the Interstate 10 corridor in the eastern portion through the Chuckwalla Valley.

Existing Site-specific Aesthetics

Reservoir Area—The mountainous landscape of the proposed reservoirs site is dominated by the disturbances associated with major hard rock mining operations. Extensive pits created when the ore was removed are bounded by benched side walls and large tailing piles. Mined areas within the project area represent highly disturbed, human-modified landscapes consisting of large open pits, tailing piles and ponds, and the remains of ore processing facilities and mining equipment. The massive amounts of tailing piles surrounding the mine exhibit regular terraces with some eroded qualities. The Eagle Mountain mine extends into the mountain slopes and presents a distinctly different visual character from the surrounding undisturbed portions of the mountains. The area around the mine is of considerable magnitude, and the contrast generated from the exposed tailing piles and storage of the excavated materials is visible from most areas within the Chuckwalla Valley north of Interstate 10. These piles contrast in shape, texture, and color with the surrounding unmodified landscape. Adjacent to the mine, the town of Eagle Mountain is largely composed of deserted homes and vacant buildings.

Views beyond the largely inactive mine site include the Eagle Mountain backdrop, which precludes views into JTNP from lower elevation points. Views across the Chuckwalla Valley from the mine site are relatively unobstructed, providing long sight lines to the Coxcomb Mountains in the distance. Human-made disturbances that visibly stand out from the natural landscape include: roads, a railroad, transmission lines for the Colorado River Aqueduct, and wood distribution poles supplying electricity to the Eagle Mountain town site. High voltage transmission lines also parallel Interstate 10; however, about 11 miles away, the definition and contrast the lines provide against the natural surroundings is muted.

Transmission Line and Pipeline—Access to the Eagle Mountain mine site and the proposed transmission line and water pipeline corridors are through the Chuckwalla Valley. The valley is representative of desert basin features and consists of relatively flat to gently sloping topography that visually separates and accents the adjacent mountain ranges. The Chuckwalla Valley, like others in the region, is dominated by colors of the physical landscape: exposed rocks, sand, gravel, and sparse vegetation. After winters with above-normal precipitation, desert wildflowers provide a colorful ground cover. Overall, the visual characteristics are created by the combinations of alluvial washes, wind-blown landforms, and vegetation.

The natural features of the Chuckwalla Valley are modified by residential and commercial developments, including the Eagle Mountain town site, Lake Tamarisk, and Desert Center. Linear landscape elements within this landscape unit include roads, transmission lines, railroads, OHV tracks, the Colorado River Aqueduct, numerous stormwater draining dikes for the interstate, and the Metropolitan Water District's pumping plant and related facilities. Primary transportation corridors within the unit include Interstate 10 and State Route 177. Kaiser Road is the main paved road from Desert Center to the proposed project site, Eagle Mountain Road is an alternative route, and other maintained and unmaintained dirt roads cross the valley.

The expansive scale and flat topography of the valley offers panoramic views of the surrounding mountain ranges from many locations. The relatively flat and uniform landscape character is typical of the regional landscape setting.

Key Viewpoints Associated with the Project

Many of the features associated with constructing the proposed project would be visible from public roads or lands that adjoin the proposed project site. Changes to the landscape would be most visible to people who use Kaiser Road, Eagle Mountain Road, Interstate 10, and State Route 177. Other important areas with views of the proposed project features include the small residential communities of Lake Tamarisk and Desert Center. Backcountry hikers in JTNP could also potentially see proposed project features from ridge tops at the park boundary.

Kaiser Road—Kaiser Road is the main travel route connecting Desert Center with the Eagle Mountain mine site. The road is about 9 miles long running north for two-

thirds of the route before turning northwest and directly toward the mine for the final one-third of the route (figure 15). Kaiser Road is also the main travel route from Interstate 10 at Desert Center to Lake Tamarisk. The road runs primarily through the middle of the valley and views along the road are the low lying areas in all directions in the foreground with the various mountain ranges as the backdrop, depending on the direction. From Kaiser Road in Desert Center (about 10 miles away from the proposed reservoirs), the existing mining operations are visible on the Eagle Mountains as contrasting colors and lines from the exposed and stockpiled mine tailings. Similarly, from Lake Tamarisk (about 9 miles away from the proposed reservoirs), the view is similar in that the contrast of the mine tailings is visible in the distance in the middle of Eagle Mountain while the sparse desert vegetation covers the foreground and valley.

Views from Kaiser Road closer to Eagle Mountain mine show that the modified landscape surrounding the mine (e.g., flat tops or terraced tailing piles) is the most visible modification in the area. The human-modified landscape also includes visible grading for the Colorado River Aqueduct, the old mine railroad, and the transmission towers to the Metropolitan Water District's pumping plant nearby.

Eagle Mountain Road—Eagle Mountain Road is a paved, two-lane asphalt road that parallels Kaiser Road about 3 miles west of Desert Center. The road provides access to the Metropolitan Water District's pumping plant, and an alternative (dirt road) route to Eagle Mountain mine via Interstate 10, but the road is gated before reaching the pumping plant to prevent public use. Views from the road looking north toward the mine site from near Interstate 10 are similar to views from Kaiser Road in that the foreground is dominated by low-lying desert vegetation, framed by the Eagle Mountains on the western flank and the taller Coxcomb mountains in the far distance about 20 miles away.

Interstate 10 near Desert Center—Interstate 10 is a federal interstate highway that runs adjacent to Desert Center and receives heavy commercial and non-commercial travel use. Riverside County designated this portion of Interstate 10 as an Eligible County Scenic Highway. Similar to views from Kaiser and Eagle Mountain roads, the most visible human-made feature on the mountains is the contrast created by the Eagle Mountain mine tailing piles. The distance to the mine reduces the effect because the surrounding mountains are striking compared to the relatively flat valley floor. Because this desert setting with interspersed mountains and valleys covers hundreds of miles, drivers on Interstate 10 may be visually saturated with the regional landscape and would likely not notice the largely inactive mine while traveling at high speeds along the highway. Features in the foreground include the small commercial and residential buildings that comprise Desert Center, the small road network, and various transmission and distribution towers. Desert vegetation has been cleared in more areas surrounding the developed areas, showing a greater amount of the ground surface than in other locations further from town.

State Route 177 East and West of Lake Tamarisk—SCE maintains a transmission ROW that cuts across perpendicular to State Route 177 about 3 miles northwest of Lake

Tamarisk. The ROW includes a maintained dirt road between a single wood pole distribution line and a taller double wood pole transmission line that runs directly toward the Eagle Mountain mine and proposed reservoirs site. Similar to the other viewpoints within the basin, the foreground is low lying vegetation with unobstructed views to the mountains that rise from the valley floor in the distance. Historical agricultural fields are adjacent to the highway, with the existing power lines in the foreground. The majority of these fields are not currently under cultivation; however, the remnants of the row cropping technique are still evident. The wood pole electric transmission system dominates the views in this area and is clearly visible, with little in the way of either natural or human-made structures to block their view, aside from the fact that the transmission system features are of similar color to the surrounding environment.

Joshua Tree National Park—The JTNP surrounds the proposed reservoirs site on three sides, with the park boundary about 1.5 miles away at the closest point. The historical iron ore mining operations extended away from the pits for some considerable distance in order to stockpile the mine tailings, and evidence of the greater mine footprint (extent of operations) is visible in aerial photography and comes within 1,000 feet of the park boundary at its closest point on the north side of the mine. Generally, this eastern park edge has very few visitor amenities. The Black Eagle Mine Road, within a non-wilderness corridor, provides vehicular access to the Eagle Mountains and connects the JTNP with the Chuckwalla Valley via the Eagle Mountain mine. Complete access is currently precluded by placement of a large boulder in the middle of the road about 2 miles outside the JTNP boundary. The mine area and the proposed reservoirs would be clearly visible from the ridge tops within the JTNP because the views would be unobstructed and the proposed facilities would be in the foreground. This area of JTNP has some historical mines, which may draw hikers exploring the rugged terrain; however, the number of visitors to the entire southeastern portion of the park is low, and few people venture to the ridge tops near the proposed project site.

3.3.5.2 Environmental Effects

Recreation

Effects of Construction on Recreation Resources

Within the Chuckwalla Valley, construction activity would occur within the Eagle Mountain mine area (proposed reservoirs, intake/outlet structures, and other infrastructure necessary to operate the project); along Eagle Mountain Road (proposed transmission line); near Desert Center (proposed interconnect substation); and across the valley (water pipeline) from near the Desert Center airport to the Eagle Mountain mine area.

The proposed reservoirs and appurtenant facilities would be constructed within the existing Eagle Mountain mine, which uses private lands, precluding public access to the area. There are no existing developed recreation facilities. Public access restrictions are

proposed to continue during the construction period and during operations. The proposed landfill project, discussed in more detail in *Land Use*, could potentially share other adjacent mine pits, which would also preclude public access to these areas.

According to maps developed by the applicant, about 2 miles of the water pipeline would cross BLM lands, and public access to these lands during construction activities would be precluded. The proposed route is adjacent to an existing transmission line ROW with wood pole towers under which is a maintained dirt access road. For about the last 3 miles, the pipeline would parallel Kaiser Road to the reservoir site.

Eagle Crest proposes to use the existing road network for access and construction laydown areas. Eagle Crest proposes to coordinate construction schedules with BLM and provide posted notices of construction activity and any temporary road/access closure. According to the proposed construction schedule, these activities would take place over a period of about 4 years (Measure REC-1). Eagle Crest proposes to use Eagle Mountain Road as the primary route for construction related traffic to and from the proposed reservoir site, as well as for construction of the proposed transmission line.

Our Analysis

Construction of the proposed transmission line would use Eagle Mountain Road as the main artery for the majority of related traffic (e.g., transporting materials, workers). Access for the construction between the Metropolitan Water District's pumping plant and the former town of Eagle Mountain via the road would need to be developed in consultation with Metropolitan Water District (for any access beyond its gate and potential conflicts with its operations) and Kaiser (for access to Eagle Mine Road if the landfill project is granted final approval, including the assignment of road ROWs to Kaiser). Although the transmission line would use the Eagle Mountain Road as access to minimize unnecessary effects on the desert ecosystem from additional spur roads, construction traffic volumes and moving machinery on site to install transmission towers could result in road closures or substantial travel delays. The road does supply access to a number of dirt roads that provide access to the existing Metropolitan Water District transmission lines just outside the JTNP boundary. Hikers wishing to use the Big Wash Hiking Corridor, which connects Black Eagle Mountain Road in JTNP with Eagle Mountain Road near Victory Pass, would be inconvenienced by the presence and activities associated with installing the transmission line outside the park. However, Eagle Mountain Road is not a through road and the number of recreation users expected to be affected by construction activities would be low. Under the applicant's proposal, posted notices would inform visitors wanting to use this road as access into JTNP or other dispersed areas in the vicinity about construction schedules and potential closures.

The volume of motorists affected by potential road closures due to water pipeline construction along Kaiser Road would be minimal and limited to vehicles traveling to the mine site where the road terminates. In addition to restricted access to the existing road under the existing transmission line, OHV and other dispersed recreation users, both

north and south of the proposed pipeline, would see and hear the construction activity associated with trenching and installing the underground pipeline.

No developed recreation facilities are located in the vicinity of the proposed interconnect substation; therefore, construction would not affect existing developed recreational facilities. The site's proximity to Desert Center suggests dispersed recreation would not exist on these lands because better options exist elsewhere in the area. Aesthetic effects of construction such as hearing noise associated with construction and seeing construction equipment and vehicles are discussed later in this section under *Aesthetics*. Any aesthetic effects associated with the construction vehicles would not continue beyond the project's 4-year construction phase.

Effects of Operation on Recreation Resources

Eagle Mountain states that the reservoirs would be fenced, and access to the reservoirs and other nearby project features would be controlled through security gates and enforced with onsite personnel. The two proposed reservoirs and appurtenant facilities would occupy the Eagle Mountain mine site, which does not have any public recreation facilities and does not allow public access.

Our Analysis

Because recreation was precluded prior to the proposed project, operations associated with the reservoirs, powerhouse, switchyard, brine pools, etc. would not affect existing developed or dispersed recreation activities within this area.

Comments received during scoping indicated concern that the proposed project may affect recreational use of nearby Chuckwalla Valley Dune Thicket ACEC (closest project feature is more than 20 miles away). No proposed project features would cross or displace lands within any ACEC within the region. This also includes the Desert Lily Preserve ACEC and Alligator Rock ACEC, which are closer to the project (closest project feature is less than 2 miles away).

No developed recreation facilities are located in the vicinity of the proposed interconnect substation; therefore, operation of the substation would not affect existing developed recreational facilities.

Effects of Construction on Recreation in Joshua Tree National Park

Construction activities would require blasting, heavy machinery, and security lighting, and would produce associated noises and air emissions during construction. The proposed reservoirs and portions of the transmission lines would be within about 1.5 miles of the JTNP boundary (see figure 15).

Eagle Crest proposes to implement night sky monitoring in collaboration with the Park Service during construction and a trial operational period (to measure changes from baseline conditions and adjust project lighting if needed). Eagle Crest proposes that final lighting designs would incorporate directional lighting, light hoods, and operational

devices that allow to be turned on as needed for safety. Eagle Crest also identifies low pressure sodium or LED lighting as potential light source types (Measure AES-1).

Our Analysis

Although the proposed project would be located outside the park, construction activities would be noticeable from points within the park. The degree to which this would degrade the values of solitude and lack of human influence must be weighed within the overall context of the setting. Human influences, including an extensive open pit mine, already exist adjacent to the JTNP and are visible from the same locations within the park from which proposed project features would be visible. The proposed reservoir area would use the mining area on the eastern slope of the mountains, and, if viewers were to reach ridge-top vistas at the extreme eastern boundary of the park, they would also see the larger, pre-existing impacts from historic mining operations and other human modifications to the landscape throughout the Chuckwalla Valley. This would be true for all points on the eastern slope of the Eagle Mountains within the park and these areas that are not easily accessible or normally popular with JTNP visitors.

Given the challenges and limited locations of possibly viewing or hearing construction activities, points off Black Eagle Mine Road, within JTNP, would provide visitors a vantage point to see into the proposed reservoirs. We estimate that the annual number of park users potentially affected by daytime construction would be in the low hundreds⁵⁹. Construction effects would begin in the first year and continue throughout the remaining period of construction, estimated by Eagle Crest to be 4 years.

Construction of the proposed transmission line would occur within less than 1 mile at its closest point to JTNP, and slightly farther under the State Water Board's preferred alternative transmission line route. Construction may cause delays or conflict with visitors wanting to access the Big Wash Hiking Corridor on the eastern slope of the mountains near Victory Pass. These construction effects would last 4 years according to the Eagle Crest's proposed construction schedule.

Construction security lighting or possible nighttime lighted construction activity would introduce additional artificial light sources to the Chuckwalla Valley; these effects could be minimized through design specifications. Backcountry campers seeking the remote nature of the eastern portion of the JTNP may experience a decrease in nighttime dark sky conditions, and the dark sky monitoring should quantify and guide design and product selection to help offset these conditions.

⁵⁹ Based on an estimated 1,000 visitors to the entire region in a year and only a fraction of those who would climb to the peaks for a view.

Effects of Operation on Recreation in the Joshua Tree National Park

Although the proposed project would be located outside the park, project features and night lighting would be noticeable from vantage points within the park. As noted previously, Eagle Crest proposes to implement night sky monitoring with the Park Service to help guide lighting product selection and design alternatives to minimize the amount of light pollution originating from the proposed project (Measure AES-1).

Our Analysis

Implementation of design techniques to minimize light pollution from security lighting surrounding the reservoirs and switchyard would concentrate light where it would be needed, reducing the amount of light contributed to the general surroundings and potentially visible from sensitive resources or locations. Techniques such as directional lighting, light hoods, and motion sensors are common in landscape design to balance the amount of light for a specific task and the light emanating away from an area. Light pollution is a byproduct of the amount of light, typically measured in lumens or candles, rather than the type of source (e.g., low pressure sodium or LED). Energy efficient lights can be used as proposed by Eagle Crest; however, thoughtful design and product selection should provide sufficient task lighting with reduced pollution. Lighting techniques would be further refined during the project's late design and early operations phases based on information developed through dark sky monitoring to be conducted by Eagle Creek and the Park Service. This monitoring would help identify and refine lighting techniques to reduce the amount of potential lighting the proposed project would contribute to the erosion of dark night skies in the area and help to identify methods to mitigate these effects. Development of a monitoring plan prepared in consultation with the Park Service that includes specific study methodology, results, recommendations, conclusions and a plan for how lighting design or equipment changes would be implemented after the findings are posted would ensure that night sky conditions are protected and potentially improved over past conditions when the town of Eagle Mountain or state penitentiary were active and provided substantial night lighting to the area. Seeing project features and night lighting would contribute to the degradation of the values of solitude and night sky conditions for visitors using that area.

Land Use

Effects of Construction and Operation of Project Facilities

The Eagle Mountain mine site is a historical industrial use area and operation of a pumped storage project would be consistent with the historical, industrial type use of the area; however, the details of securing rights to develop on the property are complex and could be tied to the outcome of the pending land exchange appeal discussed in more detail later in this section. The proposed types of land use, intensive utility or solid waste landfill, are similar to the historical land use activities associated with mining. As proposed, the pumped storage project would operate side-by-side with the proposed

landfill project (if constructed) within the existing open mine pits. Private landowners, agencies, and others have expressed concerns about the effects of degradation of existing wells based on the proposed groundwater withdrawals for this project. These concerns are discussed in section 3.3.2.2, *Water Resources, Environmental Effects*, and section 3.3.2.3, *Water Resources, Cumulative Effects*.

BLM's CDCA Plan identifies uses that are considered suitable for each land use zone. Utility features and structures, such as switch yards, transmission lines and towers and outbuildings, alter the setting and may conflict with the intended condition of some of the land use zones. Construction of two reservoirs within existing open mine pits could conflict with existing BLM CDCA Plan. Further, new transmission lines can add visual elements to the landscape away from the existing open pit mines that contrast with traditional land uses.

The proposed storage area and desalinization ponds would be located adjacent to the Eagle Mountain town site in an area south of the now-closed state penitentiary. Depending on the exact location of the ponds, construction of the ponds may require demolition of some portion of the structures associated with the now-closed state penitentiary. The town site is largely vacant; however, according to the license application, a small number of residences remain occupied. The proposed project features, including the transmission line, would be sited just a few hundred feet outside the west and south sides of the Eagle Mountain town site. Eagle Crest proposes to use existing access roads surrounding the proposed reservoir sites, also indicating that construction access to/from the proposed interconnect substation site would be from the Eagle Mountain Road exit off Interstate 10 and following the Frontage Road east to the site (Measure LU-1). Two weeks prior to beginning construction, the applicant proposes to post notices locally stating the hours of operation for construction near the Desert Center community and along State Route 177 (Measure LU-2).

Eagle Crest's proposed 13.5-mile-long transmission line would parallel the existing Eagle Mountain Road for about 4.5 miles before crossing the Chuckwalla Valley in a southeasterly direction to connect to the proposed interconnection collector substation on the western edge of Desert Center. The proposed water pipeline that would supply the reservoirs with water would be buried near an existing transmission line or road ROWs from near the Desert Center Airport to the Eagle Mountain mine.

Interior, in response to the REA notice, states its preference that the proposed transmission lines be co-located with existing transmission lines near the project site.

As described in section 1.3.2.2, *California Environment Quality Act*, and section 3.3.3.2, *Terrestrial Resources, Environmental Effects*, the State Water Board's preferred substation location, along with the proposed substation near Desert Center, is shown in figures 2, 16, and 18.

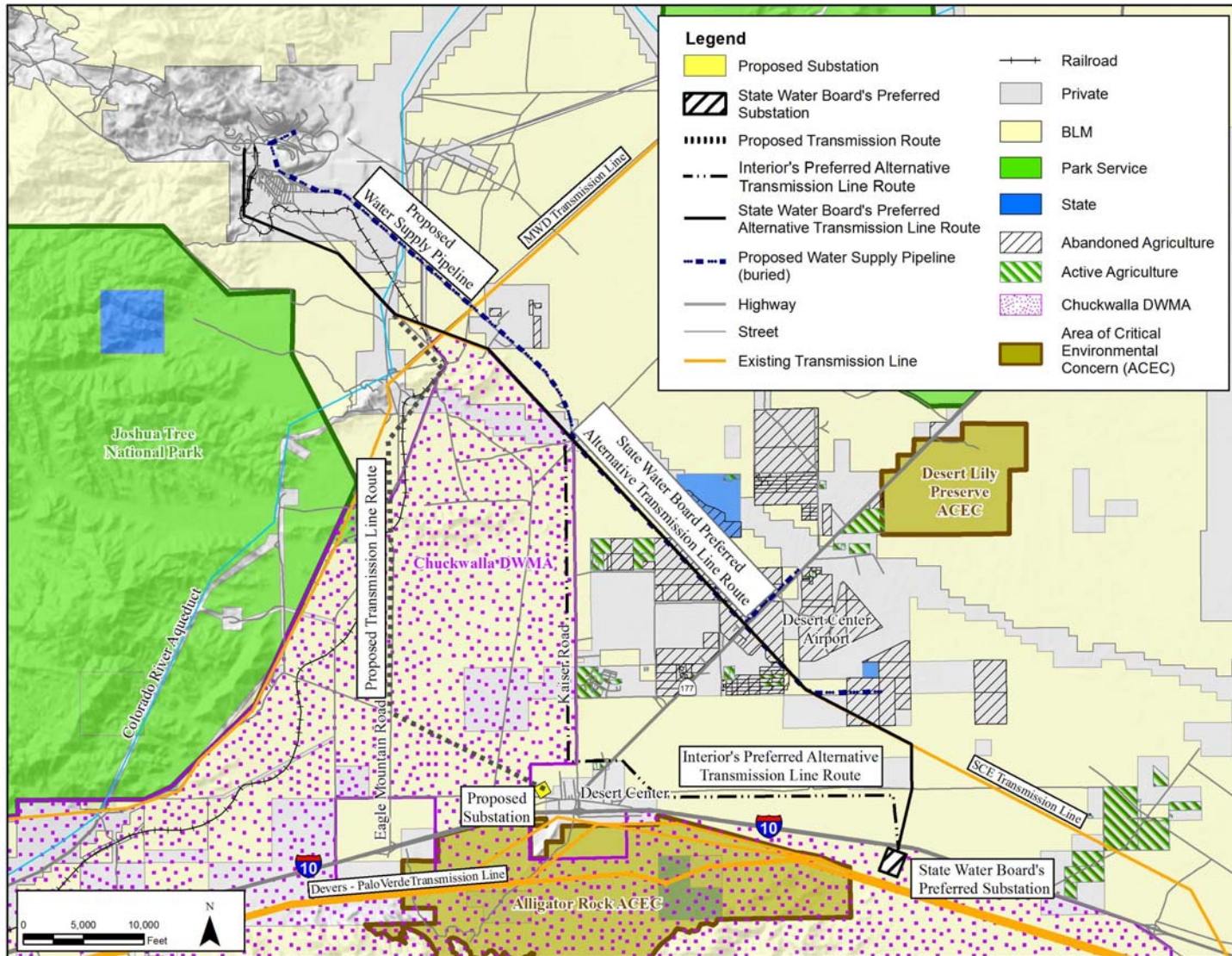


Figure 18. Land use near the applicant's proposed and State Water Board's and Interior's preferred alternative substations locations and associated transmission routes (Source: Eagle Crest, 2010a, as modified by staff).

In comments filed on the draft EIS, Interior clarified that its preferred alternative transmission line route is along Kaiser Road. This alternative route would follow the State Water Board's preferred alternative transmission line route to Kaiser Road, turn south and parallel Kaiser Road for about 5.2 miles, and then turn east and travel about 0.9 mile to a crossing over State Route 177. From here, the route would travel southeast for 0.8 mile and east for 3.7 miles, and turn south about 2 miles to the substation. In total, this alternative route is 18.6 miles long. Figure 18 shows land ownership and use in the applicant's proposed, and the State Water Board's and Interior's preferred substation locations and associated transmission line routes.

In its comments on the draft EIS, Metropolitan Water District states that to avoid potential conflicts with its ROWs, Metropolitan Water District requires entities to submit design plans for any activity in the area of its pipelines or facilities for its review and written approval. This requirement also apply to Eagle Crest's accessing the Eagle Mountain mine site via Eagle Mountain Road, which is gated just south of Metropolitan Water District's pumping plant.

In his comments on the draft EIS, Mr. Phillip Hu states that construction and operation of the proposed transmission and water pipelines would compromise his ability to pursue his business goals for his property outside Desert Center. Mr. Hu states that placement of the lines across his property would disrupt future development plans by reducing the amount of usable land for the large-scale type of development envisioned there.

The proposed water pipeline would cross undeveloped public (BLM) and some previously farmed privately owned lands. Proposed pipelines would be tunneled underneath State Route 177 and the Colorado River Aqueduct.

Our Analysis

As with other construction effects, noise and dust would likely affect the few residents of the town site; however, these activities are not uncommon to the historic and much larger operations that occurred during construction of the penitentiary and normal operations of the mine. The heavy construction activity required to build the two reservoirs and associated facilities would be consistent with prior activities of the mine site (blasting, truck traffic, and heavy machinery use). These activities would also be consistent with the activities associated with proposed landfill operations. Construction effects are estimated to be finished within 4 years.

Development of the proposed lower reservoir would present a potential conflict with certain mineral reserve interests, because the area would be inundated upon implementation of the proposed project. There are no plans to recover these reserves at this time due to the current economics associated with the remaining reserves. These mineral reserves are under the control of the California State Lands Commission. The use of the eastern mining pit as a reservoir would restrict the recovery of these mineral reserves during the life of the project.

The proposed transmission route would cross BLM lands that are managed as Multiple Use Class designations “Limited” and “Moderate” (defined above in section 3.3.5.1, *Land Use, Affected Environment*) as part of the NECO Plan, including crossing about 6 miles of the DWMA. After crossing the Colorado River Aqueduct southeast of the reservoirs, 4.5 miles of the proposed route would be sited within a designated BLM utility corridor identified in the NECO Plan. The remaining 9 miles of the proposed route would be located outside the corridor. Consequently, BLM would need amendment to the CDCA Plan prior to issuing a ROW grant to construct within the corridor.

Interior’s preferred alternative transmission line route, which would parallel Kaiser Road, would lengthen the transmission line by about 5 miles and cross a total of 109.1 acres of private lands within the 200-foot-wide ROW. Of those private lands outside the Eagle Mountain town site area, the land is currently undeveloped, and aerial imagery shows no disturbances to the desert landscape. Construction of this alternative route could require the development of temporary access roads; however, most of the route could be developed via the existing road network.

A BLM ROW access permit would be required along with a request to amend the NECO Plan to accommodate the almost 6 miles of proposed lines outside the NECO Plan’s utility corridor. Three road crossings would be required—Kaiser Road, State Route 177, and Interstate 10. Interior’s preferred alternative transmission line route would require additional coordination and permitting with the California Department of Transportation for the crossing of Interstate 10. Under Interior’s preferred alternative, 5.3 miles (128.5 acres of ROW) of the transmission line (paralleling Kaiser Road) would be located within the DWMA, and 4.5 miles (109.1 acres of ROW) would go through designated critical habitat. Construction of Interior’s preferred route along Kaiser Road would affect the residents of Lake Tamarisk with increased construction traffic, noise, dust, and delays along the road with construction of the lines within 100 feet of the entrance to the community. Effects of Interior’s preferred alternative transmission line route and the other routes on wildlife are discussed in section 3.3.3, *Terrestrial Resources*, subsection *Wildlife*.

Under the State Water Board’s preferred alternative transmission line route, about 86 percent of the 12.5-mile-long transmission line would be located on the north side of an existing 161-kV wood H-frame transmission line owned by SCE. This alternative route would pass near several residences near the existing SCE line north of the Kaiser Road crossing. East of the Kaiser Road crossing, the remainder of the route would be, at a minimum, more than 0.5 mile from existing residences. The State Water Board’s preferred alternative transmission line route would cross 203.7 acres of private land (compared with 92.9 acres for the proposed transmission line route) and would avoid, for the most part, the region’s DWMA and designated desert tortoise critical habitat (<0.1 mile of DWMA compared with 5.9 miles for the proposed route and 5.3 miles in

Interior's preferred route and 1.0 mile of critical habitat compared with 6.1⁶⁰ miles for the proposed route and 4.5 miles in Interior's preferred route). Again, under this alternative route, three road crossings would be required—Kaiser Road, State Route 177, and Interstate 10. Similar to Interior's preferred alternative transmission line route, the State Water Board's preferred route would require additional coordination and permitting with the California Department of Transportation for the crossing of Interstate 10. Under the State Water Board's preferred alternative, the line would pass within about 0.75 mile of the Chuckwalla Valley Raceway (the former Desert Center Airport). Several abandoned agricultural fields would be crossed by this alternative route where it would parallel the existing H-frame ROW between Kaiser Road and several miles south of State Route 177. Overall, this alternative transmission line route would be about 3 miles longer than the applicant's proposed route.

Eagle Crest's proposed interconnection collector substation would convert about 25 acres of currently vacant public land managed by BLM to project facilities, and the State Water Board's preferred substation location would convert about 75 acres of land also managed by BLM. A planned transmission line (Devers-Palo Verde No. 2) is expected to be constructed by SCE paralleling the south side of Interstate 10 and to which the State Water Board's preferred substation would be directly connected. Construction of the applicant's proposed project transmission line and substation would have short-term effects (e.g., noise, dust, and traffic) on the nearby residences of Desert Center, but the State Water Board's preferred substation location would be in a remote area without any nearby residences. Construction activities would be consistent with the Multiple Use Class Moderate land designation and would last less than 4 years.

Operation of Eagle Crest's proposed substation or other substation would change the current vacant nature of the site with utility uses, permanently altering the land use. The applicant's proposed substation and the State Water Board's preferred substation would also preclude the public from dispersed recreation uses on the public lands, although the sites are likely less desirable than other locations within the Chuckwalla Valley, as described elsewhere in this section under *Recreation Resources*.

Use of the Eagle Mountain Mine Road exit off Interstate 10 and Frontage Road into Desert Center as proposed by the applicant would minimize construction-related traffic in the residential community of Desert Center. The Desert Center exit off of Interstate 10 serves Desert Center, Lake Tamarisk, and motorists traveling State Route 177. Use of the proposed route (Eagle Mountain Mine Road) would minimize the amount of road damages, dust, traffic congestion and delays and other nuisances associated with construction traffic near the residential center. Eagle Crest would be required to secure use of Eagle Mountain Road for project purposes if the road becomes private under the landfill project proposal. Truck traffic congestion associated with

⁶⁰ A total of 5.9 miles of this length is also included in the DWMA.

operation of both projects would be minimal because of the proposed use of Eagle Mountain railroad for hauling trash to the central mine area.

Construction activities and the staging of materials could temporarily obstruct access to small portions of Metropolitan Water District lands, easements, facilities, transmission lines, and water conveyance facilities. Additionally, construction vehicle traffic over the Colorado River Aqueduct could damage sensitive infrastructure. Consultation with Metropolitan Water District about design plans, such as construction access for activities in the area of its pipelines or facilities including the Colorado River Aqueduct, would avoid conflicts or obstructions with Metropolitan Water District's facilities and operations.

Publically posting the proposed construction schedule and potential closures or delays would be a courtesy to local residents and motorists passing through the area. Construction of the State Water Board's and Interior's preferred alternative transmission line routes and substation location would result in more construction traffic in the Desert Center area as compared with the applicant's proposed transmission line route and substation location.

Twenty-nine acres of agricultural lands would be affected during construction of the water pipeline, while about 3 acres would be required for operations in new pipeline ROW. Review of recent aerial photography indicates that the farmlands in which the proposed water pipeline would be sited have not recently been used for agriculture purposes. The proposed open-cut, sidecast construction method would have temporary short-term effects on any active cropland. There are no structures, residential or otherwise, within 500 feet of the proposed water pipeline through the agricultural lands. Construction activities would not last more than 4 years, after which farming activities could resume, assuming appropriate settling of the restored surface has occurred. Even though very few residential structures would be affected, construction and operation of the water pipelines could reduce or limit land use opportunities, including those currently proposed and those yet to be conceived, in the currently undeveloped private parcels they would cross. However, a current landowner, Phillip Hu, has tentative plans to convert some of the land he owns into recreational vehicle and mobile home parks.

According to Eagle Crest, effects on private lands would be minimized to the extent practicable during construction. Typically, the principal measures that would help mitigate effects would be ensuring that construction proceeds quickly and minimizing the nuisance effects of noise and dust. However, Eagle Crest has provided minimal information beyond the mitigation measures it would use to regrade sidecast materials, minimize disturbance, address effects of construction, and revegetate the disturbed areas with native plants.

Effects of Construction on Proposed Eagle Mountain Landfill and Recycling Center

Issues surrounding the compatibility of the two proposed projects sharing the same general area and adjacent footprints are complex. The proposed pumped storage project was designed to be constructed and operated simultaneously with the approved landfill project, but the landfill project was not designed, planned, or permitted to operate simultaneously with another project. Both project concepts have moved through various stages of regulatory permitting over the last 20 years, and the anticipated start date for the landfill project is further complicated by the U.S. Supreme Court denial (March 28, 2011) to hear Kaiser's appeal of the 9th District Court of Appeals upholding of an earlier decision that the proposed land swap between Kaiser and BLM is illegal.

Eagle Crest suggested that the pumped storage project would be constructed first, which may cause problems for construction of the landfill as currently designed. Additionally, the pumped storage project proposes to use mine tailings in securing the mine pits and dams during reservoir construction; materials also proposed for use for landfill operations.

The proposed project would be constructed at the now non-operational Eagle Mountain mine, and certain facilities would be located on lands that also have been designated for the municipal landfill operation. The Riverside County Board of Supervisors approved the landfill project in 1992. The proposed 4,659-acre landfill would be constructed in phases over a period of many decades. Construction and operation of each phase of the landfill would progress from west to east as shown in figure 17. Initiation of the landfill is contingent on the landfill operator owning all the fee lands included in the proposal. To achieve this prerequisite, the landfill business venture and BLM had agreed on a land exchange; however, that decision was brought to court, where the exchange was overturned. This decision was upheld by the 9th U.S. Circuit Court of Appeals on November 10, 2009.⁶¹ BLM has decided not to appeal this decision; however, Kaiser has decided to pursue an appeal, continuing the legal procedures to construct the landfill. According to Eagle Crest, the proposed pumped storage project is designed to be operationally compatible with the proposed landfill should the land exchange be consummated and both projects move forward.

Due to circumstances outside this proceeding, it is unclear if the proposed landfill project would be permitted. Although this issue is unresolved, we discuss the potential effects of the landfill if constructed.

⁶¹ *National Parks v. Kaiser Eagle Mountain*, No. 05-56908 D.C. No. CV-99-00454-RT Opinion, available at <http://www.ca9.uscourts.gov/datastore/opinions/2009/11/10/05-56814.pdf>, accessed May 6, 2011.

Our Analysis

Eagle Crest's application was developed assuming construction of the project would precede construction of the landfill and there would be no overlapping construction activities. Construction of the pumped storage project first would allow the energy infrastructure to be developed without construction congestion from two major projects. Because the approval process for both projects is out of the developer's hands at this time, calculating the timing of construction schedules is not possible. If the past is any indication of the potential timing, the landfill project is still a couple of years away from a court decision, and additional time might be needed to secure any expired permits prior to starting construction. Similarly, regulatory approval and securing financing could delay the pumped storage project and theoretically the two could start construction simultaneously. Construction of both projects simultaneously would pose challenges and necessitate strong communication between parties to ensure the projects are designed and constructed to operate in such proximity.

Although the two projects are proposed for the same general area, the proposed pumped storage project facilities would be constructed and operated either underground or away from the proposed initial landfill footprint, while the proposed landfill would operate on the land surface. Although the proposed powerhouse would be underground, the land surface above this feature would, during Phase 3 of the landfill project, receive waste material for permanent storage and burial in the landfill. The proximity of these two projects may be suitable from a land use perspective because they would both be contained within the greater footprint of the historic mine operations; however, the technical details are beyond the scope of this analysis at this time. Other proposed pumped storage project facilities such as the substation, staging, storage and administration area and the reverse osmosis system and desalination ponds would be constructed south of the proposed landfill.

Effects of Operation on Proposed Eagle Mountain Landfill and Recycling Center

During the first four phases⁶² of the proposed landfill project, no overlap would occur between the landfill disposal areas and lands required for the proposed pumped storage project except for use of the primary access road into the site. The pumped storage project reservoirs would use the central and eastern mining pits, areas that are not proposed to be used during Phases 1 through 4 of the landfill. The project powerhouse and water conveyance tunnels would be constructed underground. Landfill compatibility plans submitted by Eagle Crest show that both proposed project features would be constructed to operate simultaneously with both projects within feet of each other in

⁶² The proposed landfill project would be constructed over 4 phases that would proceed over 50 years, depending on volume of waste delivered. The phases would proceed using the existing open mine pits from the west (near the proposed upper reservoir) to the east (toward the central mine pit).

some places. For example, Phase 1 of the landfill would abut the proposed south saddle dam of the upper, (central mining pit) reservoir.

Proposed Phase 5 of the landfill is projected to begin in about year 84 of operations, and it could include overlapping uses in the vicinity of the eastern mining pit, the lower reservoir for the pumped storage project.

Our Analysis

The landfill was approved by Riverside County for a 50-year operation. However, Phase 5 is not a part of the County-approved landfill project. Solid waste management has changed dramatically since the landfill project was originally proposed (e.g., implementation and increasing participation rates of recycling programs and other existing and new landfill sites currently available) and the need to permit Phase 5 could be pushed back beyond the original 50-year estimate.

Eagle Crest states that its proposed project is designed to minimize the areas of overlap to avoid potential conflict among the two proposed projects. Such design provisions include the location of staging areas, realignment of the proposed transmission line, and use of fine tailings for components of the dam structure. Comparison of the extent of visible historical earth work and modifications throughout the Eagle Mountain mine property show that there is sufficient room to design and construct these two different projects in the same general location separated by both vertical and horizontal spacing, depending on the specific location and based on Eagle Crest's proposal; however, the landfill project has not developed a design for the technical details of such a working relationship.

Effects of Construction and Operation of Project Desalinization Ponds on Land Use

Eagle Crest proposes to initially fill the reservoirs and maintain the water level in the project reservoirs from groundwater wells in the Chuckwalla Valley. Groundwater quality in combination with evaporative losses would increase the salinity, posing a risk of accelerated wear on the project structures and possible groundwater leakage. To maintain salinity and total dissolved solids levels within the reservoirs equal to that of the groundwater, the applicant proposes to construct and use a reverse-osmosis system to treat water supply in the reservoir system. Water for treatment would be drawn from the upper reservoir while treated water would be returned to the lower reservoir and the concentrated brine from the reverse-osmosis process would be directed to about 56 acres of evaporation and solidifying ponds.

Our Analysis

Eagle Crest estimates that about 2,500 tons of salt would be removed from the reservoirs each year and that these solids produced from the evaporation and solidifying ponds would need to be removed once every 10 years. Eagle Crest does not provide

information on the fate of these solids. We determined that the weight of salt is about 75 pounds/cubic foot or about 1 ton per yard, and each highway-approved haul truck is capable of carrying about 20 yards. We estimate that the removal of 1 year of salt (2,500 tons) would require about 125 truck trips. If removal were scheduled in 10-year intervals as proposed, the disposal would require about 1,250 truck trips, or substantially fewer train trips if the privately owned Eagle Mountain Railroad is used to move the salt.

Until potential uses and destinations are developed, Eagle Crest would have sufficient space within the proposed brine ponds to store this material for decades; however, it is not clear if this would significantly alter the utility of the remaining space within the ponds if they were used as storage for long periods. Eagle Crest would be responsible for the appropriate disposal of these solids, which could include transport to the proposed neighboring landfill or yet-to-be-determined, market-based opportunities (e.g., use in molten fluids for proposed concentrated solar projects throughout the region). The potential effects of brine water seeping into groundwater and surface waters are discussed in sections 3.3.2, *Water Resources*.

Aesthetics

Effects of Construction on Viewsheds

Construction and operation of the proposed project would use the existing iron ore mine, a substantially disturbed area within the Eagle Mountains, and would also introduce new visual elements in the viewsheds of BLM land throughout the Chuckwalla Valley, adjacent JTNP, and the small communities of Lake Tamarisk and Desert Center. These views would include the reservoirs, dams, power lines, water pipeline ROW, fences, brine ponds, graded and revegetated landscapes, and buildings.

Construction of the proposed reservoirs and associated facilities (e.g., powerhouse, reverse-osmosis facility, brine ponds, substation, switch yard, storage area, and surge tank) would occupy lands previously disturbed by historical Eagle Mountain mining operations.

No new roads would be developed to access the mine site because access to the site would use the existing Kaiser Road; however, additional access roads to proposed project facilities would be required. These new roads would provide access to the upper reservoir dams, inflow and outflow structures, the upper surge chamber and the access tunnel portal, and the storage/administration area. The road to the access tunnel portal and the storage/administration would be paved with asphaltic concrete; the other roads would be gravel surfaced.

Construction of the proposed 13.5-mile transmission line would occur within a 200-foot ROW, resulting in effects on a total of 327 acres required for the lines. The transmission lines would connect to a new interconnection collector substation that would be built on 25 acres near Desert Center. The buried water pipeline would run in an almost straight line from the well fields northwest to the proposed lower reservoir, a distance of about 16 miles.

During construction, Eagle Crest proposes to reduce the sidecast material to minimize the contrast that the excavated material would pose to the surrounding landscape and revegetate the fill material with native vegetation after construction.

As described in section 1.3.2.2, *California Environment Quality Act*, and section 3.3.3.2, *Terrestrial Resources, Environmental Effects*, the State Water Board has presented its preferred alternative transmission line route and substation location. Figure 19 provides the applicant-prepared VRM classes in the proposed and preferred alternative substation locations and associated transmission line routes.

Eagle Crest proposes a number of design elements and construction methods that are aimed at reducing the potential effects of construction activities of the proposed project on the aesthetic resources, including the following:

- Incorporate directional lighting, light hoods, low pressure sodium bulbs or LED lighting, and operational devices in final design to allow surface night-lighting in the central site to be turned on as needed for safety and fund night sky monitoring to be conducted in collaboration with the Park Service during the post-licensing design period, construction and a trial operational period (AES-1).
- Combine and organize staging areas and areas needed for equipment operation and material storage and assembly with construction lands to the extent feasible to minimize total footprint needed (AES-2).
- For construction of the water pipeline, reduce, to the extent possible, side-cast soils to reduce color contrast with the surrounding landscape. Backfill the pipeline disturbed zone and revegetate with native vegetation immediately following completion of pipeline construction (AES-3).
- Employ visual mitigation in the design of the transmission line to minimize visual effects (AES-4).
- Use existing access roads and construction laydown areas to the extent feasible and revegetate with native vegetation immediately following construction (AES-5).

Interior, in response to the REA notice, recommended the proposed transmission lines be co-located with existing transmission lines near the project site. In comments filed on the draft EIS, Interior clarified that its preferred alternative transmission line route is located along Kaiser Road. This alternative route would follow the State Water Board's preferred alternative transmission line route to Kaiser Road, turn south and parallel Kaiser Road for about 5.2 miles, then turn east and travel about 0.9 miles to a crossing over State Route 177. From here the route would travel southeast for 0.8 mile and east for 3.7 mile, the turn south about 2 miles to the substation. In total, this alternative is 18.6 miles long. The three transmission routes are depicted in figure 19 and other figures.

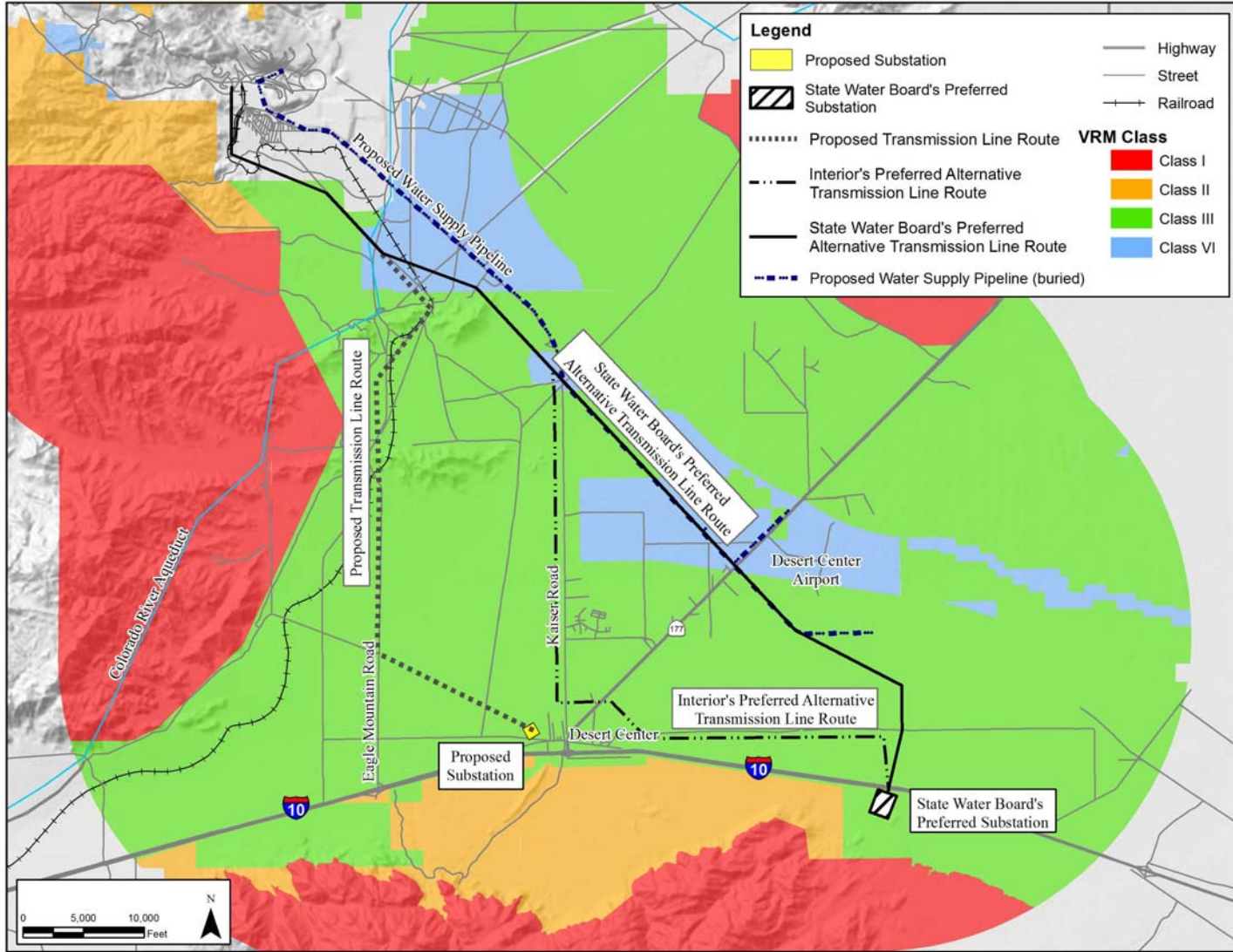


Figure 19. Visual resources in the substation and transmission line areas (Source: State Water Board, 2010, as modified by staff).

Our Analysis

Construction of the proposed project would require using on- and off-road construction vehicles, machinery, and equipment to move earth; transport and place fill; grade the proposed project footprint; drill, blast, and excavate tunnel sites; store and move raw materials; and develop other infrastructure (e.g., new roadways and underground utilities). As proposed by Eagle Crest, making efficient use of construction staging areas; using existing roads, ROWs, and construction lay-down areas to the fullest extent possible; and revegetating areas that are disturbed and unnecessary for operations would help limit the introduction of visual elements to the viewshed (AES-2, AES-3 and AES-5).

The most common views of the construction activity and the resulting changes in landscape would be from public roads. To most viewers, construction within the existing footprint of the mine would be similar to past mining operations with active heavy machinery and earth moving equipment associated with developing the new hydro structures at the site.

Because of its location on the mountain side and unobstructed setting, a portion of construction activities at the mine site would be visible from parts of the Chuckwalla Valley and potentially from as far away as Interstate 10. Activities would be most visible to people traveling along the local roads in the Chuckwalla Valley; however, the overall anticipated number of viewers is expected to be small given that both Kaiser and Eagle Mountain roads are not through routes and the overall sparsely populated nature of the area results in low traffic volume on State Route 177. Motorists travelling on Interstate 10 in the vicinity of Desert Center represent the largest number of viewers potentially affected by construction, and view durations would likely be short because of the high travel speeds (posted 70 mph speed limit) through this area and because the long viewing distances would obscure any details of the activity. The State Water Board's preferred alternative transmission line route would cross Interstate 10 and result in the motorists being able to see construction activity from Interstate 10. Construction, especially of the State Water Board's preferred alternative transmission line route, could compromise the County's designation of this portion of Interstate 10 as an Eligible County Scenic Highway.

Interior's preferred alternative transmission line route would be the same as the State Water Board's preferred route to Kaiser Road, then parallel the road toward Desert Center. After routing around Desert Center, the transmission line route would parallel Interstate 10 for about 5 miles before crossing the interstate to the State Water Board's preferred substation location. This route would position the transmission lines in proximity to the interstate and provide the longest duration views to motorists because it would run parallel the interstate. Similarly, construction of this route would be clearly visible to motorists on Kaiser Road, the residents of Lake Tamarisk and areas around Desert Center (e.g., residences and the frontage road paralleling Interstate 10). Construction of Interior's preferred alternative transmission line route could compromise

the County's designation of this portion of Interstate 10 as an Eligible County Scenic Highway. Construction activities would conflict with the existing aesthetics experienced by hikers venturing to the mountains surrounding the mine site from within JTNP since operations at the mine have essentially ceased; however, construction would be confined to an area previously disturbed during past mining activities. These effects would last for the duration of the construction activities (about 4 years). Proposed construction within the largely inactive mine area would be consistent with the applicant-prepared "Class IV" VRM scenery rating.

Transmission line construction activities would introduce heavy machinery into the area to construct the tower pads, erect the poles, and string the lines. Additionally, construction of the interconnection collector substation would require grading the site and building a series of transformers and associated electrical equipment that would be stored in a chain-link fence area. Although Eagle Crest proposes to use existing roads and access routes, additional access spurs may be required in areas where the alignment is proposed to be located away from existing road network. Constructing the additional road spurs would cause visible scars within the desert landscape. These new spurs would introduce new linear elements into the landscape.

Construction of the proposed transmission alignment across BLM land would introduce new cultural modification into the landscape, but not enough of a modification to justify lower VRM class ratings. Construction of the 54 to 68 towers, or more for the longer State Water Board's preferred alternative transmission line route, would introduce new structures, adding human development into the viewshed. The vegetation, which is generally low, brush type shrubs, would provide only marginal screening for these tall and linear features.

Views of the proposed transmission alignment within the Chuckwalla Valley, except for locations near the proposed transmission alignment, would generally be in the middle ground and foreground views to most viewers (residential centers or major roads). Segments of the proposed transmission alignment would be close to both the Eagle Mountain Road and Interstate 10, but the proposed transmission line would cross only Eagle Mountain Road. Consequently, there are numerous points where the transmission towers and corridors would be visible in the foreground, middle ground, and background. Aligning the transmission line to cross Eagle Mountain Road at an approximate 90 degree angle would slightly reduce its visual effect on road users (AES-4).

Excavation of the pipeline within the Chuckwalla Valley would be visible from motorists on most travel routes in the valley including State Route 177, Kaiser Road, and Eagle Mountain Road. Excavation of the pipeline that crosses State Route 177 and the section that parallels Kaiser Road would be clearly visible; however, the expected number of motorists on Kaiser Road in this vicinity would be minimal. Construction would introduce a visible scar across the desert valley and revegetation without assistance (e.g., watering) may take years for the site to fully recover, during which OHV use would pose a risk to the recovery process.

Effects of Operation on Viewsheds

Eagle Crest proposes to construct two saddle dams surrounding the existing central mine pit that is proposed as the upper reservoir. At its maximum normal water level, the upper reservoir would have a surface area of 191 acres at an elevation of 2,485 feet. This proposed reservoir requires two dams, one 1,100 feet long with a height of 60 feet and the other 1,300 feet long with a height of 120 feet.

The proposed lower reservoir would occupy what is now referred to as the eastern mine pit of the Eagle Mountain mine. Other than preparation of the earthen materials within the pit, no new dam would be constructed at this location. At its normal full water level, the reservoir would have a surface area of 163 acres at an elevation of 1,092 feet.

The proposed reservoir areas would include storage buildings, a substation, reverse-osmosis facilities, brine ponds, lighting, and security fencing around the entire area. The entire proposed project area near the reservoirs would be fenced and public access would be precluded. Eagle Crest indicates that facilities would have security lighting. Eagle Crest proposes that lighting would be designed to minimize light pollution through the use of directional lighting, lower intensity lights (e.g., low pressure sodium bulbs or LEDs), and operational devices to allow surface night-lighting surrounding the proposed project facilities to be turned on as-needed (e.g., motion detection). The lighting design and product selections contribution to light to the night sky would be monitored for a trial operational period.

The presence of between 54 and 68 steel lattice towers, or more for the State Water Board's preferred transmission line route, ranging in height from 175 to 235 feet with new electrical transmission wires, would introduce new, vertical human infrastructure into the Chuckwalla Valley. Towers would be spaced about 1,000 feet apart (depending on the local topography). North of the Metropolitan Water District's pumping plant, the proposed route would cross and parallel existing wood pole transmission lines and the Kaiser railroad, adding another human-made element into the landscape. South of the Metropolitan Water District's pumping plant, the proposed transmission line route would parallel the existing Eagle Mountain Road for about 4 miles before turning southeast to the interconnection collector substation site. The transmission line would introduce a new feature into the landscape and create a new vertical visual contrast that parallels the existing road. This line segment would be within the middle ground viewing distance to the greatest number of viewers (all of the lower Chuckwalla Valley, including Lake Tamarisk, Desert Center, and Interstate 10). Eagle Crest proposes to site the tower structures so that they would not be positioned on the highest topographical points along the route to minimize their effect on the desert landscape.

As described in section 1.3.2.2, *California Environment Quality Act*, and section 3.3.3.2, *Terrestrial Resources, Environmental Effects*, the State Water Board's preferred substation location would be east of Desert Center. Figure 19 provides visual resources

in the proposed and State Water Board's and Interior's preferred substation locations and the associated transmission line routes.

The proposed interconnection collector substation is proposed to have security fencing and lighting to prohibit trespass. This substation would be located less than a quarter mile west of Desert Center and would be clearly visible to residents and motorists on Interstate 10. The State Water Board's preferred alternative substation location would be on the south side of Interstate 10 and slightly closer to Interstate 10 than the proposed substation location near Desert Center.

During the evening public scoping meeting for the draft EIS on February 3, 2011, Renee Castor, chairman of the Desert Center Chamber of Commerce stated that the town is in favor of the State Water Board's preferred alternative transmission line route and substation location. The reasons stated for this preference included the negative effects of the other substation locations and transmission routes on the only viable commercial property in the town and the effects on the visual resources for the residents of Desert Center.

Our Analysis

Under Eagle Crest's proposal, the reservoirs, dams, spillway, fencing, substation, reverse osmosis plant, brine ponds, and storage area would introduce new and different uses into the historical Kaiser iron ore mine. Proposed project features near the reservoirs would be visible from areas within the Chuckwalla Valley; however, the details would be difficult to ascertain because the features would be in the viewers' middle ground and within the already disturbed Eagle Mountain mine site. These structures would supplement additional lines and structures into the already heavily manipulated landscape within the mine footprint. The presence of water within the two proposed reservoirs would introduce a new visual feature absent from previous operations and completely different from the surrounding desert landscape.

Because of the site's setting in the Eagle Mountains, views of the water would be possible only from higher vantage points, which in the local area is limited to the peaks mostly within the JTNP. Recreation estimates mentioned in section 3.3.5, *Recreation, Land Use, and Aesthetics*, indicate that the mountains in the southeastern portion of the park receives very low use levels (tens of people per day). Locations within the JTNP that provide views of the proposed project features would also include views of the Chuckwalla Valley, which includes in the foreground the existing disturbed setting surrounding the mine from historical mining operations as well as existing transmission lines, the Eagle Mountain town site, and Metropolitan Water District's pumping plant.

From within Chuckwalla Valley, the reservoirs would be most visible in the foreground and middle ground distance, with diminished visibility proportional to the observer's distance. Views of the proposed facilities, most notably the flat top of the upper reservoir dam, could be visible from Kaiser Road and State Route 177; however, the flat lines would be consistent with the existing terraced look of the tailings piles, and

given the distances, topographical obstructions would mask the new facilities to most viewers. Given the distance to Interstate 10 still further southeast, it is unlikely that the majority of the public would be able to discern the features associated with the reservoirs as separate or unique from the existing features related to the historical mining operations. Operation of the proposed reservoirs would not justify any change to the BLM VRM Class C designation.

Implementation of night sky monitoring, as requested by the Park Service, would help gather the data necessary to understand the potential changes to the night sky due to proposed project security lighting. Development of a specific night sky monitoring study and plan in consultation with the Park Service, as described above, would ensure that findings from the monitoring result in design or product selection that minimizes light pollution from project sources. Incorporation of low-light emitting policies and design elements would prevent further degradation of the dark night sky in close to the JTNP, thereby preserving wilderness qualities in areas out of direct sightlines of the proposed facilities.

Visibility of transmission lines within the Chuckwalla Valley would be greatest to motorists on Eagle Mountain Road near the town site and Kaiser Road (both of which have low traffic volumes) because this section would be in the middle ground. This transmission line section would also be visible to hikers on or near the ridge tops in the JTNP designated wilderness area and lower elevations within the park within the wilderness buffer zone. From these vantage points the proposed transmission alignment would be in the foreground and middle ground viewing distances. Because there are existing wood pole transmission lines, rail lines, an abandoned air strip, the existing Colorado River Aqueduct switchyard and forebay associated with the pumping plant, and a small cluster of residential buildings in the view, the proposed transmission line would be incremental to the existing visual conditions within this portion of the alignment. Towers built with dull finish and carrying conductors with qualities that reduce glare and visual contrast as proposed by Eagle Crest, would be consistent with construction trends designed to minimize visual contrast from new transmission lines.

At its closest point, the proposed transmission line route that parallels the existing Eagle Mountain Road, would be less than a mile from the JTNP boundary; however, visual contrast observed from locations within the JTNP currently includes the existing power line to the Metropolitan Water District's pumping plant, numerous dirt roads in the area, and the railroad in the foreground. As previously discussed, the southeast area of JTNP receives a very little amount of visitor use. This segment of the line would parallel Eagle Mine Road, minimizing the amount of disturbances required in developing access spur roads to construct and maintain the towers. This section of the proposed line would not justify a lower VRM class rating (existing Class III).

Visual contrasts of the proposed access and spur roads and towers would become greater as the route leaves the Eagle Mountain Road and crosses to the proposed interconnection collector substation site 2.5 miles away. This segment would be clearly

visible in middle- and foreground viewsheds from key viewpoints, notably Interstate 10, Lake Tamarisk and Desert Center. Visual contrast would be high due to increased visibility of a new utility structure and details introduced into the natural landscape. Although views from Interstate 10 are of short duration, they sweep across the proposed route due to the bend in the interstate alignment, providing panoramic views of the Chuckwalla Valley. Visual effects of the proposed line would be greatest for this segment because it would run across most of the western portion of the lower valley and be located in the foreground of the greatest number of potential viewers, motorists on Interstate 10. Operating the lines as along Kaiser Road as preferred by Interior would add new linear features independent of existing features (Colorado River Aqueduct transmission line, SCE transmission line, and railroad) at the eastern toe of the Eagle Mountains. Continuing the route south along Eagle Mountain Road across Interstate 10 to a new western substation would introduce a new overhead element visible to all highway traffic.

Positioning the substation to the south of Interstate 10 reduces the visual contrast of the feature by minimizing its presence in the overall panoramic view; however, the substation's location would intrude on views of Alligator Rock from east-bound travelers on Interstate 10. This effect would be limited to views within a few miles of the site because the intervening topography blocks direct sightlines of the substation area until it is within the foreground view.

Operation of the new substation may result in a new source of light and glare from night lighting. Use of non-reflective materials, designs that minimize light glare (such as shielding and directional light hoods) may reduce these effects. Most of the transmission line would be within middle ground and background view zones. The visual change here would be high and would not meet VRM Class II or III objectives. The State Water Board's preferred substation location would be to the south of Interstate 10 on lands classified by BLM as VRM Class III. This location is remote and more than 5 miles from the population center of Desert Center. The location is also on the periphery of segments along Interstate 10 that provide maximum panoramic views of the Chuckwalla Valley. The substation's size and discordant mass of equipment at varying heights would create a strong contrast to the surrounding natural features that would dominate views from Interstate 10 due to its location within foreground distance zones. The substation structures would intrude into views of Alligator Rock. Such views, however, would be brief; the substation becomes most visually apparent about 2 miles out, which at 70 mph would be visible for 2 minutes or less. Planting of desert vegetation at strategic locations and treatment of features (e.g., color, nonspecular material) would reduce visual contrast but not sufficiently within foreground view zones to avoid appearing in the skyline or to meet VRM Class III designations.

The State Water Board's preferred alternative transmission line route would connect with the applicant's proposed transmission line route north of the Metropolitan Water District's pumping plant, then parallel SCE's existing 160-kV wood H-frame transmission line. The State Water Board's preferred alternative transmission line route

would continue to parallel the existing line southeast for about 10 miles before turning south and leaving the existing H-frame line to cross Interstate 10 to the State Water Board's preferred substation location. This route is also preferred by the Desert Center Chamber of Commerce because it would avoid the town more than the other routes, thus avoiding the effects on commercial property in the town while also limiting the viewing of the substation and transmission lines.

More than 60 percent of the route would cross through BLM managed lands with VRM Class III designations while the remainder is Class IV. Some of these lands are currently proposed to be used for large-scale solar projects. The State Water Board's preferred alternative transmission line would be located adjacent to an existing transmission line ROW for 10 of its 12.5 miles. The vertical forms of the lattice towers would be visible, but difficult to discern in middle-and background view distances as a result of the scale, existing towers and variable texture of the valley landscape. The route would affect foreground views of travelers on State Route 177 but these would be in addition to the existing SCE 160-kV line along the road sides.

With the exception of the Interstate 10 crossing, the State Water Board's preferred alternative transmission line route would create an incremental increase of the visual effect caused by the existing transmission line and would not dominate the view of the casual observer. The level of change created by this alternative would be moderate and would continue to meet the spirit of VRM Class III and IV objectives.

About 2 miles from Interstate 10, the State Water Board's alternative transmission line route would turn south and leave the existing transmission line ROW. The vertical form and lines of the lattice towers would become more visible as the route approaches the foreground view zone of Interstate 10. The route's perpendicular alignment and crossing of Interstate 10 would minimize the extent and time the line would be visible from Interstate 10 travelers, but the overall change in the foreground view zone caused by the towers and the proposed east substation would be high.

Interior's preferred alternative transmission line route would parallel the State Water Board's preferred route to Kaiser Road where it would turn south, paralleling Kaiser Road to an area near Desert Center turning east and paralleling Interstate 10. More than 60 percent of Interior's preferred alternative transmission line route would parallel existing road ways with half of that along Interstate 10. Interior's preferred route would also be located independently of other transmission lines already in operation within the Chuckwalla Valley from Kaiser Road to the State Water Board's preferred substation location. The towers would be located in the foreground and clearly visible to motorists along Kaiser Road and Interstate 10. The level of change by Interior's preferred alternative route would be moderate and would continue to meet the spirit of VRM Class III and IV objectives.

Revegetation of the disturbed areas from installing the underground water pipeline and unneeded construction laydown areas and transmission line access roads is proposed, using native plants that may take decades to mature given the rate at which desert

ecosystems respond. After the initial filling of the reservoirs, only a single groundwater well is proposed to be retained to provide replacement water to the reservoirs. Although Eagle Crest has not disclosed plans for the exact location or how the well site would be secured (e.g., fencing, building), the site would likely occupy a small footprint.

3.3.5.3 Cumulative Effects

Participants in scoping identified concerns about the proposed project's cumulative effects on recreation and land uses within the Chuckwalla Valley. The proposed project is one of numerous proposed projects for the Chuckwalla Valley that would contribute to past, ongoing, and future effects on future land uses, wilderness values, and dark night sky conditions. Future, planned developments within the Chuckwalla Valley, including additional transmission line projects, the potential landfill, and numerous solar projects are likely to contribute effects on these resources.

Recent legislation (California Senate Bill 107, Renewable Energy Portfolio Standard and Executive Order S-14-08) requires that 33 percent of all electricity generated in California originate from renewable sources. This in combination with the federal American Recovery and Reinvestment Act (stimulus funding) has resulted in a number of renewable energy proposals to be constructed in the California deserts. In the Desert Center area, five large-scale solar projects have been proposed, totaling more than 30,500 acres, with many more solar energy projects proposed for the greater Mojave Desert. These projects would contribute to the conversion of the rural desert landscape to one potentially filled with utility-grade solar projects and appurtenant facilities including transmission lines. Construction and operation would result in increased traffic and possibly a long-term demand for more services in the Lake Tamarisk and Desert Center areas, further contributing pressure for more land use conversions. Additional congestion and human development in the area would put additional pressure on the dispersed recreation opportunities throughout the area.

Development of the proposed project would contribute to conversion of the landscape to one filled with more human-made energy infrastructure; however, the proposed project could also have positive effects on the growing renewable energy industry due to its energy storage capabilities. For example, energy generated from other renewable sources (e.g., wind) at night could be stored and substituted for non-renewable sources when other renewable sources may not be as reliable. Eagle Crest would not be able to choose where its electricity would originate to move the water to the upper reservoir; however, there is a growing concern related to the need for large-scale energy storage systems to better balance the electrical grid.

Development and operation of the proposed project in addition to other potential projects, including the landfill and solar projects, may have an effect on the wilderness experiences of visitors to the remote eastern margins of JTNP. As described in the discussion of *Aesthetics* earlier in this section, these projects would be most noticeable to park visitors near the eastern boundaries. Development of the proposed landfill would

increase rail and truck traffic in the Eagle Mountain mine area as solid waste is prepared and stored. Hauling of salt produced as part of this project would contribute additional truck traffic to local roads.

Utility-scale solar projects are another human development that has the potential to be more visible to JTNP users in the reasonably foreseeable future. Thousands of solar panels or reflection mirrors are proposed to be constructed in the Chuckwalla Valley, which could reflect the sunlight and catch the attention of JTNP users. Currently, there are no solar projects within the Chuckwalla Valley. The development of these projects and the associated security lighting would also contribute to the degradation of night-sky conditions to JTNP visitors to the area overlooking the valley.

Construction of the transmission line would add to the cumulative effects on land use because the construction of 13.5 miles of line and dozens of towers would contribute additional energy infrastructure into the Chuckwalla Valley. Siting the line outside the existing BLM utility corridor as proposed would contribute to incremental erosion of the large open spaces the utility corridors are designed to preserve.

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

Section 106 of the National Historic Preservation Act

Section 106 of the NHPA as amended requires the Commission to take into account the effects of licensing a hydropower project on any historic properties and allow the Advisory Council a reasonable opportunity to comment if any adverse effects on historic properties within the hydropower project's APE are identified. If Native American properties have been identified, section 106 also requires that the Commission consult with interested Native American tribes that might attach religious or cultural significance to such properties.

Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. In this document, we also use the term "cultural resources" to include properties that have not been evaluated for eligibility for listing in the National Register. In most cases, cultural resources less than 50 years old are not considered eligible for the National Register. Cultural resources need enough internal contextual integrity to be considered historic properties. For example, dilapidated structures or heavily disturbed archaeological sites may not have enough contextual integrity to be considered eligible. TCPs are a type of historic property that are eligible for the National Register because of their association with cultural practices or beliefs of a living community that: (1) are rooted in that community's history; or (2) are important in maintaining the continuing cultural identity of the community (Parker and King, 1998).

Area of Potential Effects

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by the issuance of a license within a project's APE. The APE is determined in consultation with the California SHPO and is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. In this case, the APE for the Eagle Mountain Project includes lands within the proposed project boundary, plus lands outside the proposed project boundary where project operations may affect the character or use of historic properties and/or TCPs. In its AIR response filed December 22, 2009, Eagle Crest states that the APE is identical to the proposed project boundary and includes:

- the spillway from the upper reservoir, which would flow into Eagle Creek;
- Eagle Creek from the spillway to the lower reservoir;
- the spillway from the lower reservoir; and
- the access road to the West Saddle dam and to the elevator shaft.

The California SHPO stated that it did not object to how the APE was defined (letter from M.W. Donaldson, California SHPO, Office of Historic Preservation, Sacramento, CA, to Russ Kaldenberg, Principal, ASM Affiliates, Carlsbad, CA, December 22, 2009).

Several transmission line routes were later considered for the project. As indicated in the HPMP, filed March 4, 2011 (Eagle Crest, 2011), the State Water Board's preferred alternative transmission line route has been included in the APE.

Cultural History Overview

Prehistoric Background

The prehistory of Southern California is divided into three temporal periods: Paleo-Indian, Archaic, and Late Prehistoric. The Paleo-Indian period dating from 10,000–6,000 B.C. is typified by non-ceramic stone tool assemblages, rock features, and cleared circles in the Colorado Desert, which have been assigned to the San Dieguito pattern (10,000–6,000 B.C.). The San Dieguito pattern represented a hunter-gatherer adaptation by which small, mobile bands exploited small and large game and collected seasonally available wild plants.

The Archaic period (6,000 B.C.–A.D. 500) in southern California is typified by the Pinto and Amargosa patterns (6,000 B.C.–A.D. 500), which are considered regional specializations within the widespread hunting-gathering adaptations that characterized the Archaic period. Information suggests that the California deserts were less hospitable during the Archaic period, and that the mobile hunter-gatherers were forced to concentrate around limited locations or move to more habitable regions. The small

quantity of artifacts at some sites suggests strategically stored food and seed processing equipment that was used by small mobile groups.

The Late Prehistoric period (A.D. 500–1900) is typified by the Patayan pattern and innovations such as the introduction of pottery making by the paddle-and-anvil technique, bow-and-arrow technology, and the introduction of floodplain agriculture. Agriculture and ceramics were probably introduced either from northwestern Mexico or from the Hohokam culture on the Gila River in present day Arizona.

Between A.D. 1000 and 1700, desert peoples of this region appear to have extended their focus somewhat away from the Colorado River floodplains to a more mobile, diversified resource procurement pattern, with increased travel between the river and Lake Cahuilla to the southwest). Long-range travel to special resource collecting zones and ceremonial locales, trading expeditions, and possibly warfare are reflected by the numerous trail systems seen throughout the Colorado Desert. Pot drops, trailside shrines, and other evidence of transitory activities are often associated with these trails, including within the Chuckwalla Valley and at springs and other water sources in the surrounding mountains and washes. The final recession of Lake Cahuilla by about A.D. 1700 resulted in a return to reliance on the Colorado River floodplain and increasing population growth in the Coachella Valley and San Jacinto and Santa Rosa mountains.

Ethnohistoric Background

Ethnographically (Post A.D. 1540), the project vicinity was occupied by the Colorado River People, the Desert Cahuilla, and the Chemehuevi.

The Colorado River People, known as the Halchidhoma, were a Yuman-speaking group who lived along the Palo Verde Valley of the lower Colorado River Valley, in the vicinity of modern Parker and Blythe. Although somewhat distant from the project area, they are likely to have traveled between their homeland and the Coachella Valley via the Chuckwalla Valley. Foods were procured by seasonal rounds of hunting, fishing, and gathering supplemented by small-scale agricultural practices. The primary source of dietary animal protein came from fish caught in the Colorado River. Residential bases were centered on the Colorado River but conformed to a seasonal pattern. Spring and summer houses were located near agricultural fields, but on the mesas, where they would be safe from floods, open-air ramadas were constructed on the floodplains adjacent to the fields. During the winter season, Colorado River People relocated to residential bases on Colorado River terraces and the lower mountain slopes

Likewise, while the principal residential locations of the Desert Cahuilla were in the Coachella Valley and the Santa Rosa and San Jacinto mountains, they were also known to have traveled and maintained cultural contact with Colorado River peoples. The Chuckwalla Valley would have been one of their principal travel corridors for this purpose. A dozen or more independent landholding Cahuilla clans lived within the region. In addition to each lineage's residential area and other locations within a clan territory, ownership rights to various food-collecting, hunting, and other areas were

claimed by the various lineages. While villages were occupied year-round, a large number of their inhabitants would leave at specific times to exploit seasonally ripening foods in different environmental zones. Temporary camps would be established in these food-collecting areas, and surpluses would be transported back to the main village. Many animal resources were also hunted. Cahuilla clans were arranged so that each community was placed in an area near water and food resources. Throughout the area there were sacred places used primarily for rituals, inter-clan meetings, caching sacred materials, and shamans' activities. European diseases probably began to affect the Cahuilla in the early 1800s and became particularly severe in the 1860s. In 1876 and 1877, the United States government set aside small reservations for all groups classified as "Mission Indians." These reservations were established in a checkerboard pattern encompassing 48 sections, spread across the eastern edge of the Santa Rosa and San Jacinto mountains and the Coachella Valley. With various additions and withdrawals over time, these lands have remained the permanent land base of the Cahuilla to the present.

The Chemehuevi occupied desert areas west of the Mohave and north of the Cahuilla probably in the period between A.D. 1200 and 1500. The Chemehuevi lived in smaller and more mobile groups than the Cahuilla or the Yuman-speakers, in order to adapt to the sparser and more widely distributed and scarcer resources of their desert. The Chemehuevi were great travelers and regularly visited many of their neighbors and may have brought them into the general project area more often than other groups. They subsisted primarily on small game and a wide variety of seasonally available wild plants. The Chemehuevi have distinguished themselves from their Yuman neighbors by their very different mythology, worldview, religious practices, kinship system, and political organization. Between 1865 and 1871 some indigenous groups began moving south to inhabit the newly created Colorado River Reservation. Additional land was added to the Colorado River Reservation in 1874 to encourage the Chemehuevi to move there from areas near Blythe, Needles, Beaver Lake, and Chemehuevi Valley; however, not until the early 1900s did the Chemehuevi agree to move.

Historic Background

Extensive mineral exploration in the project vicinity began in the early 1860s. In 1881–1882, Jack Moore staked a claim and with his father and two other partners founded the Eagle Mountain Mining District for the exploitation of iron, gold, and silver. They failed to maintain the necessary assessment work to validate the claim and the area was abandoned for mineral development until 1895. That year L.S. Barnes began to consolidate the claims within the area. He completed his consolidation by 1912 and sold the package to Henry E. Harriman, CEO of the Southern Pacific Railroad.

World War II saw an enormous demand for steel, but shortly prior to the war in 1936, the Joshua Tree National Monument was formed, and the boundary included the Eagle Mountain claims, thus protecting the ore bodies from mining. Henry J. Kaiser then took interest in the Eagle Mountain claims. He purchased the Eagle Mountain claims from the Harriman heirs and succeeded in having the Joshua Tree Monument boundaries

shifted to exclude the Eagle Mountain properties. He then began work in 1944 to survey a new railroad route between Eagle Mountain and the Southern Pacific Railroad. Construction on the railroad began in 1947 and was completed on June 23, 1948, as the Kaiser Industrial Railroad (Eagle Mountain Industrial Railroad). Ore shipment from the mine began immediately, and by 1971 the Eagle Mountain iron mine was producing 90 percent of California's total iron output.

More than 4,000 people were employed in the operation, making the Eagle Mountain mine Riverside County's largest employer. The company town of Eagle Mountain included schools, fire and police departments, civic facilities, 416 rental houses, 185 trailers, 383 dormitory rooms, and 32 apartments. As a result of establishing the Eagle Mountain mine and employing thousands, Kaiser provided his workers with a comprehensive medical plan, which later became known as Kaiser Permanente. Competition from abroad and other economic factors caused the mine to close in 1983 after 35 years in operation. Much of the housing stock was either removed, left vacant, or vandalized. By 1994, a school, a new low-security prison, and some rental properties remained at Eagle Mountain, but it is largely a ghost town today.

The town of Desert Center was founded in 1925 by Stephen Ragsdale and his wife after buying a homestead that was developed about 10 years earlier. The town remains as a waypoint on Interstate 10, which runs near the southern edge of the project area and is a major transportation artery connecting the Los Angeles area with Arizona. The route may have been used prehistorically because it represented a relatively low (but dry) corridor for travel between the lower Colorado River in Palo Verde Valley and the Coachella Valley. During the early twentieth century, as the region's highway system was gradually developed, the route was known under a succession of different designations, including Legislative Route 64 and U.S. Route 60. Interstate 10 was completed in 1968.

The Colorado River Aqueduct runs through the study area. The aqueduct was constructed between 1931 and 1941 by Metropolitan Water District as one of the major Colorado River water delivery public works projects, which also included the construction of Hoover dam and other canals supplying water to southern California. These projects are recognized as pivotal components that allowed the enormous growth of the Los Angeles area during World War II and in the following decades. In 1955 and 1994, the American Society of Civil Engineers (ASCE) recognized the Colorado River Aqueduct as one of the "Seven Engineering Wonders of American Engineering" (ASCE, 2010).

The deserts of southern California and western Arizona became the focus of important military training exercises during World War II. The project area is located near what was once the Desert Training Center, a 10- to 130-square-mile area that was opened on April 30, 1942, as the largest military training installation ever created. This facility had General George S. Patton, Jr., as its first commanding officer and served the vital purpose of training troops for desert warfare conditions and tactics in preparation for

the North African Campaign. After the Allied victory in North Africa in 1943, an emphasis on desert warfare was no longer necessary. The name of the Desert Training Center was changed to the California-Arizona Maneuver Area (CAMA) on October 20, 1943, and its purpose was expanded to serve as a simulated theater of operations emphasizing large-scale logistics and not exclusively desert warfare training and tactics. The facility provided training for combat troops, service units, and staff under conditions similar to a combat theater of operations until its closure in May 1944. Divisional camps that may have deployed troops into the project area include Camp Desert Center, Camp Iron Mountain, Camp Granite, and Camp Coxcomb, all of which are located north of Desert Center. A network of railroads and roads connected all the divisional camps and depots. Many smaller camps, bivouacs, firing ranges and other facilities were constructed throughout the Desert Training Center/CAMA.

The divisional camp nearest the project area was Camp Desert Center; it was located between Camp Young and Desert Center and extended immediately east of Eagle Mountain Road and north of the old highway that preceded Interstate 10. Very little documentary information is currently known for Camp Desert Center, and its specific history and range of functions are not clearly understood. BLM did not include Camp Desert Center in its interpretive plan for the major camps of the Desert Training Center/CAMA, although the interpretive plan includes preservation and interpretive goals for the other major sites. The 34,000-acre area included a barracks area with tent housing, an observer's camp, an ordinance camp, an evacuation hospital, a quartermaster truck site, and an extensive maneuver area.

Previous Cultural Resources Investigations

Eagle Crest conducted a search of cultural resource records housed at the Eastern Information Center of the California Historic Resources Information System at the University of California, Riverside, and at the BLM Palm Springs Field Office. This search was supplemented by a review of reports available at ASM Affiliates. This record search was augmented by additional information provided by ECORP Consulting, Inc. (ECORP), a firm that had conducted a recent survey in the project area but had not yet provided a report to the California Historic Resources Information System. The background research identified 56 previous reports within a 1-mile radius of the project APE, of which 27 included portions of the project area proper (ASM Affiliates, 2010, 2009a).

As cited by ASM Affiliates (2010, 2009a), previous studies that were found to have addressed significant portions of the project's APE include Cowan and Wallof (1977; RI-00220), Wallof and Cowan (1977; RI-00222), Carrico et al. (1982; RI-00221), Bull et al. (1991; RI-03321), Love (1994; RI-03949), ASM Affiliates (2003), and the ECORP study (no reference provided).

During these previous studies, a total of 123 cultural resource sites were recorded within a 1-mile radius of the project area. Of these, only six sites are located at least

partially within the project APE: an underground portion of the Colorado River Aqueduct (site P-33-06726), which is crossed by the proposed transmission line route and the proposed and alternative water line corridors; the Eagle Mountain mine and town site (site P-33-006913), two resources associated with the Desert Training Center 36th Evacuation Hospital (P-33-015971, P-33-017642), and two prehistoric sites (P-33-015091, P-33-015093). The Eagle Mountain town site record includes the railyard and in at least two locations, the project alignment intersects the Eagle Mountain Industrial Railroad, which is considered part of the Eagle Mountain mine and town site complex.

Identified Resources

Prehistoric and Historic Archaeological Resources

In March 2009, Eagle Crest conducted an intensive archaeological survey of the accessible portion of the project APE, encompassing 620 acres. A final report titled *A Class III Field Inventory for the Proposed Eagle Mountain Pumped Storage Project, Riverside California* (ASM Affiliates, 2009b) was prepared that presented the results of the fieldwork. The survey area included the 200-foot-wide State Water Board-preferred alternative transmission line route, Interior's preferred alternative transmission line route, other routes, the 60-foot-wide proposed and alternative water line routes, two proposed collection substation locations, and four potential water supply well locations. Access to lands within the APE owned by Kaiser was not granted; these lands, including the Eagle Mountain mine and town site and associated railroad, were not surveyed.

In section 6 of its July 2010 supplemental information filing, Eagle Crest presents the preliminary results of ASM Affiliates' recent archaeological survey of the applicant's proposed and the State Water Board and Interior's preferred alternative transmission routes or substation locations (Eagle Crest, 2010a). A summary of the survey results were provided in a letter report titled *Results of Class I Record Search and Class III Field Inventory of Eagle Mountain Pumped Storage Project Alternative Transmission Line Corridors and Substations* (ASM Affiliates, 2010). In this letter report, ASM Affiliates states that the report only provides the preliminary results of the survey and that an addendum to the original project survey report prepared by ASM Affiliates would be forthcoming. The addendum (ASM Affiliates, 2011) was provided as an appendix to the revised HPMP filed with the Commission on March 4, 2011.

State Water Board's Preferred Alternative Transmission Line Route

The cultural resources survey report (Eagle Crest, 2010a) states that for the State Water Board's preferred alternative transmission line route and substation, cultural resources data were based on the recent survey information provided by ECORP (no reference provided).

Based on the records search, the information provided by ECORP, as cited by ASM Affiliates (2011), and the subsequent archaeological survey and HPMP, a total of six archaeological sites were identified within the surveyed portion of the APE as defined

above, including the Eagle Mountain mine and town site. Table 20 provides a summary of all archaeological sites identified within the State Water Board's preferred alternative transmission line route to date.

Table 20. Archaeological and historic resources within the State Water Board's preferred alternative transmission line route (Source: ASM Affiliates, 2011, 2010, 2009a, as modified by staff).

Primary Number/ Temporary Designation	Description	Date	National Register Eligibility
P-33-000626	Colorado River Aqueduct	1931–present	Unevaluated; assumed eligible
P-33-006913	Eagle Mountain mine and town site (including railroad)	1947–1983	Previously determined not eligible (1996); pending re-evaluation
DS-326	Two Historic rock features (cairns)	1940s	Unevaluated but recommended not eligible
DS-327	Historic mining claim marker	1950s–1960s	Unevaluated but recommended not eligible
DS-330	Historic rock feature	Unknown	Unevaluated but recommended not eligible
DS-495	Historic Desert Training Center/ California-Arizona Maneuver Area refuse deposit	1940s	Unevaluated

Although it has not been formally evaluated, Eagle Crest assumes that the Colorado River Aqueduct (P-33-006726) is eligible for listing on the National Register. In the area of the proposed crossings, the aqueduct occurs as a deeply buried, massive, underground pipeline where the transmission line and waterlines would cross the aqueduct route. It is virtually invisible on the surface except for a road and earthen berm. The California SHPO agreed that assuming eligibility of this structure was acceptable (letter from M.F. Donaldson, California SHPO, Office of Historic Preservation Sacramento, CA, to R. Kaldenberg, ASM Affiliates, Carlsbad, CA, December 22, 2009).

Both the Eagle Mountain mine and the town site are recorded as P-33-006913. This property also includes features associated with the Eagle Mountain Railroad. In a previous consultation, BLM and the California SHPO concurred that this property was

not eligible for the National Register (letter from C. Widell, California SHPO, Sacramento, CA, to H.R. Bisson, District Manager, BLM, California Desert District, Riverside, CA, December 12, 1996). However, at the time of the original 1996 determination and SHPO consultation, the property did not meet the 50-year age requirement for listing on the National Register. Because it now meets that requirement, the California SHPO subsequently requested re-evaluation of the resource (letter from M.F. Donaldson, California SHPO, Office of Historic Preservation Sacramento, CA, to R. Kaldenberg and J. Schafer, ASM Affiliates, Carlsbad, CA, October 26, 2009).

Four additional historic-era resources were also recorded within the APE (DS-326, DS-327, DS-330, and DS-495). Site DS-327 is a standing wooden post that appears to be associated with a nearby mining claim but has no documented mine patent or record. In its HPMP, filed March 4, 2011, Eagle Crest recommends that this feature is not eligible for the National Register. Site DS-330 is a historic rock feature that was determined by an ECORP archaeologist to be less than 50 years old (personal communication, E. Denniston, 2010, as cited in Eagle Crest, 2011). In the HPMP, Eagle Crest states that site DS-326, which consists of two historic-era rock cairns, and site DS-495, a moderately dense refuse scatter dating to the World War II-era Desert Training Center/CAMA, require National Register evaluation; however, these two sites have also been recommended to be ineligible (ASM Affiliates, 2011, 2009b).

The Agua Caliente Band of Cahuilla Indians expressed concern with regard to prehistoric trails that may pass through the area (letter from S. Milanovic, Tribal Historic Preservation Office [THPO] Intern, Department of Historic Preservation, Agua Caliente Band of Cahuilla Indians, Palm Springs, CA, to G. Gillin, Project Manager, GEI Consultants, Rancho Cordova, CA, August 26, 2008). Such trails may be archaeological in nature and may also be considered TCPs. Eagle Crest responded that it was aware of previously recorded trail segments and associated sites that would have served as alternate travel routes to the Cocomaricopa Trail connecting the Colorado River to the Coachella Valley (letter from R. Kaldenberg, Principal, ASM Affiliates, Carlsbad, CA, to Sean Milanovich, THPO Intern, Agua Caliente Band of Cahuilla Indians, Palm Springs, CA, September 10, 2009). However, Eagle Crest stated that no evidence of prehistoric or ethnohistoric trails was found within the project APE and that existing records indicated that the trail system was located elsewhere.

Interior's Preferred Alternative Transmission Line Route

Interior's preferred alternative transmission line route would follow the State Water Board's preferred alternative transmission line route to Kaiser Road but would turn south and parallel Kaiser Road for about 5.2 miles, then turn east and travel about 0.9 mile to a crossing over State Route 177. From there, the route would travel southeast for 0.8 mile and east for 3.7 mile, and turn south about 2 miles to the substation. This area is not currently depicted on maps contained within the HPMP as lying within the project APE, but it would be included in the APE if this alternative is ultimately selected for construction.

A total of 23 cultural resources properties are located within Interior's preferred alternative transmission line route (ASM Affiliates, 2011) (table 21). These properties include the Colorado River Aqueduct and the Eagle Mountain mine and town site that are also located State Water Board's preferred alternative transmission line route, plus 13 historic refuse deposits, four prehistoric lithic scatters, three historic mining sites, and one prehistoric habitation site. In addition to the Eagle Mountain mine and town site and the Colorado River Aqueduct, only the prehistoric habitation site was recommended as potentially eligible for listing on the National Register because it could provide information relevant to prehistoric use and travel routes within the Chuckwalla Valley.

Table 21. Archaeological and historic resources within the Interior's preferred alternative transmission line route (Source: ASM Affiliates, 2011, as modified by staff).

Primary Number/ Temporary Designation	Description	Date	National Register Eligibility
P-33-000626	Colorado River Aqueduct	1931–present	Unevaluated; assumed eligible
P-33-006913	Eagle Mountain mine and town site (including railroad)	1947–1983	Previously determined not eligible (1996); pending re-evaluation
P-33-015091	Prehistoric lithic scatter/rock ring	Unknown	Recommended not eligible
P-33-015093	Prehistoric lithic scatter	Unknown	Recommended not eligible
P-33-018104	Historic refuse	Unknown	Recommended not eligible
DS-115	Historic refuse	Unknown	Recommended not eligible
DS-120	Historic refuse (Desert Center Dump)	Unknown	Recommended not eligible
DS-123	Historic refuse	Unknown	Recommended not eligible
DS-124	Historic mining	Unknown	Recommended not eligible
DS-125	Historic refuse	Unknown	Recommended not eligible
DS-132	Historic refuse	Unknown	Recommended not eligible
DS-137	Historic mining	Unknown	Recommended not eligible
DS-178	Historic refuse	Unknown	Recommended not eligible

Primary Number/ Temporary Designation	Description	Date	National Register Eligibility
DS-179	Historic refuse	Unknown	Recommended not eligible
DS-195	Historic refuse	Unknown	Recommended not eligible
DS-239	Historic refuse	Unknown	Recommended not eligible
DS-240	Prehistoric habitation	Unknown	Recommended potentially eligible
DS-245	Prehistoric lithic scatter	Unknown	Recommended not eligible
DS-313	Historic refuse	Unknown	Recommended not eligible
DS-314	Historic refuse	Unknown	Recommended not eligible
DS-315	Prehistoric lithic scatter	Unknown	Recommended not eligible
DS-703	Historic refuse	Unknown	Recommended not eligible
DS-705	Historic mining	Unknown	Recommended not eligible

The Agua Caliente Band of Cahuilla Indians concerns with regard to prehistoric trails that may pass through the area (letter from S. Milanovic, THPO Intern, Department of Historic Preservation, Agua Caliente Band of Cahuilla Indians, Palm Springs, CA, to G. Gillin, Project Manager, GEI Consultants, Rancho Cordova, CA, August 26, 2008) would also apply to Interior's preferred alternative transmission line route.

Traditional Cultural Properties and Sacred Sites

Contact with Native Americans that have traditional ties to the Eagle Mountain Project vicinity began in September 2007. On April 16, 2008, Eagle Crest's consultant requested a records search of the California Native American Heritage Commission's (NAHC's) Sacred Lands File. A response was received on April 30, 2009, stating that no sacred lands were known within the proposed project area.

Since September 2007, Eagle Crest and/or the Commission have requested input on the proposed project from the following Native American tribes:

- Agua Caliente Band of Cahuilla Indians,
- Barona Band of Mission Indians,
- Cabazon Band of Mission Indians,

- Cahuilla Band of Mission Indians,
- Chemehuevi Indian Reservation,
- Colorado River Indian Reservation,
- Fort Mojave Indian Tribe,
- Morongo Band of Mission Indians,
- Torres-Martinez Desert Cahuilla Indians, and
- Twenty-Nine Palms Band of Mission Indians.

The Agua Caliente Band of Cahuilla Indians requested a meeting to discuss the proposed project. The Morongo Band of Mission Indians also expressed an interest in the proposed project area. However, to date, no potential TCPs have been identified within the project APE.

3.3.6.2 Environmental Effects

Effects of Project Operations on Cultural Resources

Cultural resources can be disturbed by any action (natural, animal, or human) that disturbs soils or ground surfaces on which they occur. Archaeological and historic-era sites are particularly susceptible to damage as a result of construction activity.

Eagle Crest has identified six cultural resource properties that are located within the APE, including the APE encompassing the applicant's proposed and the State Water Board's preferred alternative transmission line route and substation (see table 20). Including the Colorado River Aqueduct and the Eagle Mountain mine and town site, Interior's preferred alternative transmission line route contains 23 documented cultural resource sites.

The Colorado River Aqueduct has not been evaluated for the National Register, but will be treated as eligible. In its application, Eagle Crest states that because the Colorado River Aqueduct is buried where it would be crossed by proposed project transmission and water pipelines, construction activities are unlikely to affect the qualities of the property that could make it eligible for the National Register.

In its application, Eagle Crest cites the California SHPO's 1996 letter concurring that the Eagle Mountain town site and mine are not eligible for the National Register. Further, the last sentence in section 1, *Overview and Executive Summary*, of the HPMP also implies that this resource is not a historic property. However, in the HPMP, Eagle Crest correctly acknowledges that the site and its associated railroad may now meet National Register eligibility criteria and that project construction and subsequent operation and maintenance activities have the potential to affect this resource.

Because the project also could potentially affect previously unidentified cultural resources and human remains, the Agua Caliente Band of Cahuilla Indians (letter from S.

Milanovic, THPO Intern, Department of Historic Preservation, Agua Caliente Band of Cahuilla Indians, Palm Springs, CA, to G. Gillin, Project Manager, GEI Consultants, Rancho Cordova, CA, August 26, 2008) and the Cabazon Band of Mission Indians (Eagle Crest, 2009c) both recommend the presence of cultural resources monitors during construction activities.

In its HPMP, Eagle Crest proposes to treat sites DS-326, DS-327, and DS-495 within the State Water Board's preferred alternative transmission line route as eligible for the National Register and states that these sites can be avoided during through project design to mitigate potential effects. No measures are proposed for DS-330 because the HPMP states that it does not meet the age requirement for National Register eligibility. The HPMP does not discuss, or provide specific measures for resources located along Interior's preferred alternative transmission line route.

Our Analysis

Construction and operation activities of the proposed Eagle Mountain Project would have the potential to affect known cultural resource properties, including the Colorado River Aqueduct, which remains unevaluated but is considered to be eligible for the National Register; the Eagle Mountain mine and town site (P-33-006913) and its associated railroad; and the 39 unevaluated sites identified within the applicant's proposed and the State Water Board's preferred transmission line routes and substation locations or the 21 unevaluated sites within Interior's preferred alternative transmission line route. Project construction and operation activities also could potentially affect potential TCPs, unanticipated discoveries, and human remains that may be identified in the future.

In its June 2009 final license application and subsequent HPMP, filed March 4, 2011, Eagle Crest proposes measures to address sites potentially subject to adverse project effects. We analyze and discuss these proposed measures in *Management of Historic Properties* below.

Management of Historic Properties

In its June 2009 final license application, Eagle Crest proposed several measures to address potential project effects to cultural resources. These are:

- CLT-1—Evaluate cultural sites for their National Register eligibility;
- CLT-2—Monitor sensitive areas during construction; and
- CLT-3—In the event that historic properties or human remains are identified during construction of the project, develop an HPMP in consultation with BLM, the California SHPO, and Native American tribes.

These measures would apply only to lands within the APE outside of the Kaiser property. In December 2009, Eagle Crest filed an HPMP (referred to herein as CLT-4) that contains measures for the State Water Board's preferred alternative transmission line

route, including measures for potential project effects on cultural resources located on Kaiser lands. A revised HPMP, filed March 4, 2011, addresses requirements contained within the Commission's draft EIS. The HPMP contains and replaces Measures CLT-1 through CLT-3 referred to in the final license application.

The HPMP was developed in consultation with the California SHPO, BLM, Agua Caliente Band of Cahuilla Indians, Cabazon Band of Mission Indians, Chemehuevi Indian Reservation, Colorado River Reservation, Fort Mojave Indian Tribe, Morongo Band of Mission Indians, Torres-Martinez Desert Cahuilla Indians, and the Twenty-Nine Palms Band of Mission Indians (Eagle Crest, 2009e). The HPMP would be used by Eagle Crest staff to ensure that the management goals for the preservation or appropriate treatment of historic resources are achieved. The HPMP was prepared in consideration of a document prepared in consultation with the Commission titled, *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* (FERC and Advisory Council, 2002). In its HPMP, Eagle Crest Energy proposes to undertake a variety of general measures for implementing the HPMP and managing cultural resources, including:

- Appointment of a historic properties management coordinator, who would be responsible for overseeing implementation of the HPMP.
- Preparation of an annual implementation report during project construction and over the license term. These reports would be provided to agencies and tribes and describe all activities associated with the HPMP that were undertaken during that reporting period.
- Preparation of a plan to review the effectiveness of the HPMP every 6 years in consultation with the California SHPO, BLM, Riverside County, interested tribes, the Commission, and other consulting parties.
- Pre-action review of planned actions involving ground disturbance conducted by the historic properties management coordinator in consultation with the California SHPO, interested tribes, and appropriate land management agencies, as specified in the HPMP.
- Implementation of protocols for future cultural resources field investigations (i.e., field survey, archaeological testing, data recovery or other alternative mitigation measures), which include consultation with the California SHPO, agencies, and interested tribes.
- Implementation of a plan and procedures to address the inadvertent discovery of previously unknown cultural resources or human remains. This plan would provide for the development of an as-needed monitoring program for sensitive areas.
- Development of a cultural resources element for a project WEAP that would ensure that Eagle Crest employees are familiar with cultural resource laws and

regulations, instructions on HPMP protocols and requirements, and other information regarding historic properties. This plan would be developed in consultation with Native American tribes.

- Development of interpretive signage that would be placed outside the main gate of the proposed facility and would provide the public with information about the prehistory and history of the project area, the Native Americans who inhabited the area, and background information on the functioning of the Eagle Mountain Project. Public interpretation would be developed in consultation with Native American tribes.
- Development of a plan to address curation of any recovered archaeological materials.
- Implementation of measures to address handling of paleontological resources that could be identified on federal lands in the future.

The HPMP also includes measures specific to potential historic properties identified within the State Water Board's preferred alternative transmission line route. Eagle Crest proposes to design project transmission lines and water pipes to avoid direct or indirect effects on buried portions of the Colorado River Aqueduct and archaeological sites DS-326, DS-327, and DS-495 and archaeological sites DS-326, DS-327, and DS-495. Inspections would be undertaken every 2 years to determine whether conditions are stable or if any disturbances or deterioration has occurred. If project effects on these resources are unavoidable, a formal National Register evaluation program would be implemented. No measures are proposed for site DS-330 because it does not reach the 50-year threshold for National Register-eligibility. Further, upon license issuance, Eagle Crest proposes to prepare a phased work plan to document the Eagle Mountain mine and town site and associated railroad, including the potential for a historic district, upon gaining legal access to the lands. Upon completion of documentation of the site and any other cultural resources within the Kaiser property in the APE, Eagle Crest would consult with the California SHPO, BLM, and the Commission to evaluate National Register eligibility. If any resources are determined to be eligible, the HPMP calls for avoidance or mitigation measures to be developed, and consultation with the California SHPO with regard to potential project effects. Finally, in the event that interested tribes identify potential TCPs within the project APE, Eagle Crest's proposed HPMP includes a plan to document and evaluate such properties and to resolve project adverse effects on TCPs that are eligible for the National Register.

In its draft EIR, the State Water Board (2010) comments that the construction would have potentially significant effects on the Colorado River Aqueduct (P-33-06726), resources located in the central project area (e.g., the Eagle Mountain mine and town site and associated railroad, P-33-006913), and unknown or buried cultural resources. However, the State Water Board concluded that these effects would be reduced to less than significant, if the measures proposed within the HPMP are implemented.

Our Analysis

Eagle Crest's proposal to appoint a historic properties management coordinator would ensure that the requirements of the HPMP are followed. Additionally, annual reporting to agencies and affected tribes on the status of overall cultural resources management would provide a forum for parties to discuss the HPMP and provide recommendations about management of cultural resources. Such reporting would ensure that consulting parties are regularly informed of project activities and any cultural resources issues that may arise over the license term. The frequency of reporting could be decreased in the future if the Commission and other consulting parties agree that annual reporting is no longer warranted.

Eagle Crest proposes to review the HPMP every 6 years. Affording appropriate federal land-management agencies the opportunity to comment, along with the California SHPO and tribes, on proposed revisions to the HPMP would ensure that those with an interest in the management of cultural resources would be able to contribute their views. Such a review process is typically undertaken every 5 years under FERC hydroelectric project licenses. However, Eagle Crest's plan to review the HPMP every 6 years concurrent with the Licensed Hydropower Recreation Report (FERC Form 80) would likely provide comparable protection to cultural resources. If consulting parties wish to request an earlier review based on the results of the annual HPMP implementation report, Eagle Crest could include a clause in the HPMP to allow for an earlier review.

As specified in the HPMP, Eagle Crest's implementation of review procedures prior to ground-disturbing activities and protocols for future cultural resources field investigations would ensure that cultural resources are considered during project planning and that appropriate studies are undertaken. Further, the HPMP, Appendix A, contains protocols to be followed if previously unknown cultural resources or human remains are identified during project activities. Implementation of these measures would ensure that new discoveries are treated appropriately.

The HPMP also discusses the need for archaeological monitoring during construction activities and states that if archaeological monitoring is required, it would be conducted by a qualified cultural resources specialist and by a designated Native American monitor. A monitoring protocol has been provided in the HPMP that indicates the circumstances under which monitors would be required, the roles and authorities of monitors, monitoring documentation, and other requirements. Implementation of the monitoring protocol would ensure that monitoring is undertaken appropriately both during construction and over the license term.

Eagle Crest's proposal to include a cultural resources element to its WEAP program would ensure that its staff is regularly informed about issues, procedures, and protocols regarding cultural resource management in the project area. Additionally, Eagle Crest's proposal to install interpretive signage regarding cultural resources would enable the public to become aware of the cultural importance of the project area. The inclusion on the signs of information pertaining to site protection and applicable laws

would provide an effective vehicle for educating the public about vandalism, its effects, and its potential legal consequences. Eagle Crest proposes to consult with interested Native American tribes during the development of the training sessions and afford them with an opportunity to provide input on the interpretive signs would contribute toward staff and public understanding of Native American perspectives on cultural resources.

Implementation of the measures for the identification, management, and treatment of resources associated with the Colorado River Aqueduct and the Eagle Mountain town site, mine, and associated railroad that are contained within Eagle Crest's proposed HPMP would ensure that the potential effects of either the State Water Board's or Interior's preferred alternative transmission line routes upon these resources are properly addressed in accordance with section 106. Additionally, the measures proposed for sites DS-326, DS-327, and DS-495 are also appropriate. Because DS-330 does not reach the 50-year National Register threshold for eligibility, no further measures for this resource are required.

Section 3.3 of the HPMP provides measures to ensure cultural resources are appropriately addressed for our recommended transmission line corridor and substation. However, if Interior's preferred alternative transmission line route were selected for construction, implementation of the same measures under section 3.3 of the HPMP would ensure that the 23 cultural resources located within the corridor's APE would be addressed appropriately under section 106.

Finally, we find that Eagle Crest's proposed plan (in the HPMP) to address newly discovered paleontological resources that may be identified on federal lands⁶³ satisfies the recent paleontological law enacted by Congress in March of 2009. Although we recognize that section 106 has no provisions for protecting paleontological resources, such resources should be protected in any case, and it is appropriate to use an HPMP to reference the protection of such resources because they are similar in nature to archeological resources.

3.3.7 Socioeconomics

3.3.7.1 Affected Environment

Riverside County is located in southern California and stretches from the Colorado River and Arizona border in the east to Orange County and within 14 miles of the Pacific

⁶³ See Omnibus Public Land Management Act of 2009, Public Law 111-011. P.L. 111-011, Title VI, Subtitle D on Paleontological Resources Preservation (123 Stat. 1172; 16 U.S.C. 470aaa). This statute requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal land using scientific principles and expertise. The Omnibus Public Land Management Act -Paleontological Resources Preservation includes specific provisions addressing management of these resources by BLM, the Park Service, U.S. Bureau of Reclamation, FWS, and the Forest Service.

Ocean to the west. The county encompasses about 7,200 square miles. The socioeconomic study area is defined as the unincorporated areas of eastern Riverside County (Eagle Mountain, Lake Tamarisk, and Desert Center) and cities within about 60 miles of the project (Blythe, Coachella, Indio, Palm Desert, Cathedral City, and Palm Springs). This description of the socioeconomic environment relies upon statistics at the county level, with local details provided where data are available.

Population

The population of Riverside County grew 35 percent from the 2000 census of 1,545,387 to an estimated 2,088,322 in 2008 (California Department of Finance, 2008, as cited by Eagle Crest, 2009a). The county's population ranks fourth of California's 58 counties and is more than the population of 15 states in the United States. The city of Riverside, which is the county seat and is located about 100 miles west of the project site, had an estimated 2008 population of 296,842, equaling 14 percent of the county's residents.

Population trends for the study area towns are shown in table 22. Most have grown more rapidly than the county as a whole, although some of that growth was in the population of inmates in the Chuckwalla Valley State Prison and Ironwood State Prison. The inmates are counted in the city of Blythe's population for state tax purposes.

Table 22. Population (Source: Riverside County Economic Development Agency, 2004, as cited by Eagle Crest, 2009a).

Area	1980	1990	2000	2007
Blythe	6,805	8,428	20,465	22,625
Cathedral City	^a	30,085	42,647	52,115
Coachella	9,129	16,896	22,724	38,486
Indio	21,611	36,793	49,116	77,146
Palm Desert	11,081	23,252	41,155	49,752
Palm Springs	32,359	40,181	42,805	46,858
Riverside County	663,166	1,170,413	1,545,387	2,031,625

^a Incorporated in 1981.

Eagle Mountain is located in an 802-square mile Census block group that had a population of 738 people in 1990 and 977 people in 2000, giving it a population density of 1.2 people per square mile. The project site is located about in the center of the Census block group.

The Eagle Mountain town site population peaked at 3,700 residents (CH2M HILL, 1996, as cited by Eagle Crest, 2009a), and was listed as having 2,453 people in 1970 and

1,890 people in 1980 (U.S. Bureau of the Census, 2008, as cited by Eagle Crest, 2009a). The closing of the mine in 1983 also led to the closing of the private town of Eagle Mountain, and also slowed or stopped growth in nearby communities such as Desert Center and Lake Tamarisk.

Riverside County is expected to double its population between 2000 and 2020, reaching an estimated population of 2.9 million people in 2020 (Riverside County, 2003, as cited by Eagle Crest, 2009a). The county grew in total population by 31.5 percent between 2000 and 2007, while the state of California grew by only 7.6 percent during the same time period.

The county has an average of 214.4 people per square mile in 2006 but much higher in the urbanized west and much lower (1.2 people per square mile) in the project region and similar low densities in surrounding open spaces of the central and east portions of the county.

Employment and Income

The Riverside County Economic Development Agency (2009, as cited by Eagle Crest, 2009a) states that the unemployment rate within Riverside County from 1990 to 2006 has been above the state and national averages. The agency's data show a civilian labor force of 910,400 residents with 845,700 employed and an unemployment rate of 7.1 percent in February 2008. The County experienced an unemployment rate of between 5.1 percent and 6.7 percent from 1998 to 2007. Riverside County employment by sector for 2006 is depicted in table 23.

The United States Census states that the median household income in 2006 was \$53,508 for Riverside County, which was below the state median of \$56,645. The California Department of Finance shows that in 2005 the per capita income for Riverside County was \$27,167, which was 73.6 percent of the California average. The United States Census shows that 12.2 percent of people were below the poverty level in 2006, down from 14.2 percent in 2000 and up from 10.8 percent in 1990 (U.S. Bureau of the Census, 2008, as cited by Eagle Crest, 2009a).

The Riverside County Economic Development Agency (2006, as cited by Eagle Crest, 2009a) shows the taxable sales within the County were \$29,816,237 in 2006, up from the 2001 total of \$18,231,555. The tax rate for Riverside County including state, local, and district tax is 7.75 percent.

Table 23. Riverside County employment by sector, 2006 (Source: U.S. Bureau of the Census, 2008, as cited by Eagle Crest, 2009a).

Industry	Individuals	Percentage
Agriculture, forestry, fishing and hunting, and mining	13,824	1.6%
Construction	112,297	12.7%
Manufacturing	90,885	10.3%
Wholesale trade	32,279	3.7%
Retail trade	119,795	13.6%
Transportation and warehousing, and utilities	40,334	4.6%
Information	16,973	1.9%
Finance, insurance, real estate, and rental and leasing	58,680	6.7%
Professional, scientific, management, administrative	80,500	9.1%
Educational, health and social services	147,594	16.7%
Arts, entertainment, recreation and food services	90,159	10.2%
Public Administration	35,430	4.0%
Other Services	42,553	4.8%
Total	881,303	

Infrastructure and Accommodations

Housing

The California Department of Finance's (2008, as cited by Eagle Crest, 2009a) data indicate that there were about 773,331 housing units in the county in 2008, compared to 584,674 units in 2000. The figures for 2008 include 559,169 units of single family housing and 127,740 multiple family units. The median home price for the County stood at \$234,105 in January 2009. Housing accommodations for towns in the project region are depicted in table 24.

Table 24. Housing accommodations and characteristics (Source: Riverside County Economic Development Agency, 2008, as cited by Eagle Crest, 2009a).

	Median Home Price		Median Rental Price	Total Units		Vacancy Rate		Owner Occupied
	2000	2008	2000	2000	2008	2000	2008	2000
Blythe	\$90,800	\$187,000	\$501	4,851	5,444	16.2%	16.1%	57%
Cathedral City	\$125,500	\$226,500	\$695	17,813	21,561	21.7%	21.1%	65%
Coachella	\$83,700	\$215,500	\$470	4,807	8,814	4.4%	4.4%	61%
Indio	\$99,000	\$272,500	\$579	16,899	26,464	18.0%	18.0%	56%
Palm Desert	\$189,100	\$382,500	\$744	28,071	34,120	31.5%	31.0%	67%
Palm Springs	\$157,000	\$295,000	\$631	30,979	33,479	33.3%	33.4%	61%
Riverside County	\$146,500	\$275,000	\$660	584,674	773,331	13.4%	13.0%	69%

In 2008, the vacancy rate for all housing units (single family, multiple family, and mobile homes) within the County was 13 percent. Within the project region, Palm Springs accounted for the highest vacancy rate at 33.4 percent or 11,192 units in 2008. The City of Coachella experienced the lowest rate at 4.4 percent or 386 units. The combined total number of vacant housing units for the six towns within the project region is 28,021, with 100,533 vacant units county-wide (California Department of Finance, 2008, as cited by Eagle Crest, 2009a). The U.S. Census 2005-2007 Community Survey shows 193,931 renter-occupied housing units with 12,818 vacant rental units and a rental vacancy rate of 6.2 percent.

Within the cities in the project region, there are about 257 hotels/motels accounting for 11,599 rooms. Palm Springs contains the highest number with 187 hotels and motels and 6,400 rooms (Riverside County Economic Development Agency, 2004, as cited by Eagle Crest, 2009a).

Community, Municipal, and Social Services

Community and social services available in the County include educational facilities, churches, libraries, hospitals, and nursing homes.

All major municipalities within the project region provide basic municipal services. Within unincorporated areas, services are provided by Riverside County.

Within the project region and specifically the Eagle Mountain area, water and sewer systems are adequate to meet the communities' existing needs. In addition to the basic services provided in the Eagle Mountain area, the County also provides enhanced services through County Service Areas (CSA). CSA 51, which includes the Eagle Mountain area, provides water, sewer, and trash disposal services. The Eagle Mountain town site has water and sewer services provided by Kaiser's wastewater collection and treatment system and two Kaiser-owned wells.

Enrollment of students in the Riverside County K-12 schools for 2006/2007 is 413,059. In addition, there are 23 school districts within the County. These districts contain 265 elementary schools, 74 middle schools and 65 high schools, 11 charter schools and 50 continuing education/adult education schools. The school districts employed 21,663 certified staff members with 11.8 average years of teaching experience and 17,105 classified staff.

Riverside County and local municipalities within the project region maintain law enforcement departments. Riverside County currently employs 1,879 patrol officers and a total of 3,865 funded positions. The nearest County Sheriff station to the project site is the Colorado River Station located in Blythe (Riverside County Sheriff's Department, 2008, as cited by Eagle Crest, 2009a), more than 40 miles from the proposed project site.

The major municipalities within the project region maintain fire departments. Riverside County operates 93 stations with 952 career and 1,100 volunteer personnel for unincorporated and sixteen contract cities. Riverside County station #49 at Lake Tamarisk is the closest station with #45 Blythe Air Base and #43 Blythe being the next nearest stations. All three stations are staffed full time, 24 hours a day, 7 days per week with a minimum 3-person crew, including paramedics.

Municipalities within the project region provide emergency medical services in addition to fire protection. The nearest hospitals to the project site are located at Indio and Blythe, each more than 40 miles away. Riverside County has about 18 licensed hospitals with 3,134 beds. Within the project region, there are four licensed hospitals with 816 beds. Within the County there are 24 community clinics, 35 surgical clinics, and 3 rehabilitation clinics.

3.3.7.2 Environmental Effects

Effects of Construction on Socioeconomics

Construction of the proposed project is expected to occur over a period of 4 years and to generate about 4,674 person-months of employment during that time. Peak monthly employment of 209 workers would occur in Year 2.

Eagle Crest estimates the total construction workforce payroll cost for the project to be \$58 million. Additionally, project construction is estimated to require \$39 million in design engineering, \$49 million in construction administration and engineering, and \$3 million in legal and administrative costs. The distribution of this payroll would

fluctuate over time and would parallel the fluctuations in employment. Labor expenditures would be highest in Year 2.

Eagle Crest does not propose any mitigation measures related to socioeconomic parameters such as employment, income, or local government services.

Our Analysis

Project construction would have a beneficial effect on local employment and income. Eagle Crest expects that most of the general labor required during construction would be available from the labor pool within the County and project region, indicating that as much as 50 percent of the skilled trades and management and support personnel could also be provided by regional labor. There would be some need for non-local workers to meet the project manpower requirements. Current estimates of the peak construction work force and the expected percentage of non-local workers suggest that during the peak period about 105 workers would require short-term (2 years or less) housing accommodations.

Eagle Crest is not proposing to use the Eagle Mountain town site for employee housing, but expects that workers needing short-term housing would find lodging in the available houses, rental units, or hotel/motel rooms that are locally abundant. This includes 28,021 vacant housing units and 12,818 vacant rental units within the County, as well as about 11,600 hotel/motel rooms within the communities of Blythe, Cathedral City, Palm Desert, Palm Springs, and Indio.

Primary and secondary schools within the project region have room for additional students if any school age children accompany the construction workers who temporarily relocate to the area.

Medical facilities also appear to be adequate, with one bed per about 645 people within the County. In addition, Riverside County operates a full-time fire station in Lake Tamarisk. Eagle Crest would be required to follow the Development Impact Fee Program as adopted by Riverside County to assess fees for the fire district. Because no new housing construction is anticipated, it is expected that existing public services (water, sewer, waste) would meet the requirements of the project-related workforce.

Because of the anticipated small effect on municipal services and infrastructure, the effect on local municipal costs during construction is expected to be insignificant; further, as described below, it would be offset by anticipated tax revenues.

The project would contribute to the revenues of County and local governments primarily through the payment of property taxes and sales and use taxes. With respect to property taxes, the assessed valuation of the project and the associated property tax payments would rise on an annual basis, in proportion to the work completed. Based upon on the construction cost estimate and tax schedule, Eagle Crest estimates that property taxes would rise to about \$8,390,000 (2008 dollars) per year by the time construction is complete. Sales tax, at a rate of 7.75 percent, is imposed on the sale of

tangible personal property and specified services. With an estimated construction cost of \$1,171 million (2009 dollars), the project could generate substantial sales tax revenue through the purchase of material and equipment within the county, although the amount of those purchases has not been estimated.

Project construction would also have indirect effects on employment, income, and government revenues associated with the construction workforce and the purchase of materials and supplies. For construction activity of this type, gross output multipliers often range from 1.0 to 1.5. This means for every dollar spent in the county on materials and supplies, the indirect effect would account for an additional \$1.00 to \$1.50 in spending.

Employment multipliers also generally range from 1.0 to 1.5 for construction projects. This means for every construction job created, another 1.0 to 1.5 job(s) would be created in the retail, service, and non-basic employment sectors.

Effects of Operations on Socioeconomics

An estimated 30 persons would manage, operate, and maintain the project, working in two 15-person shifts. The total staff requirement per shift includes three management personnel, seven engineers, two power plant operators, one maintenance technician and two administrative staff. Energy Crest estimates the annual labor cost (operations staff plus home office administration) at \$2.3 million (2009 dollars).

Eagle Crest does not propose any mitigation measures related to socioeconomic parameters such as employment, income, and local government services.

Our Analysis

The socioeconomic effect of the project during the operation phase would be much less than during the construction phase, although the project estimates an annual operating budget of \$28.3 million (2009 dollars).

The annual O&M budget for project supplies and parts would be \$2.5 million. Purchase of supplies and parts within the region would add annual local economic benefits.

The project would not have any substantial ongoing effects on local/County government costs. The relatively small labor force is unlikely to create any effects on housing, schools, and other public services within the project area.

Eagle Crest estimates that the project would generate about \$7.67 million per year in property tax revenue at the completion of construction. Sales tax revenue would decrease during the project's operational phase compared to the construction phase, but Eagle Crest estimates that about \$187,500 in annual sales tax revenue could be generated from the purchasing of plant supplies and parts. Eagle Crest may also be required to pay taxes on the tangible personal property on the facility (equipment, inventories, etc.).

The ongoing expenditures for materials, services, and payroll would also generate indirect benefits within the region. The typical multiplier for utilities operations is 1.5 for employment. Therefore, the operations workforce of 30 personnel may generate up to an additional 15 indirect or secondary jobs.

There would be no displacement of residences or business establishments due to construction and operation of the project.

Environmental Justice

The proposed location of this project was chosen due to the availability of two largely inactive mining pits separated by a relatively short distance with an elevation difference of about 1,400 feet. Both elements are key to the viability of a pump storage facility as are the proximity to transmission lines and existing and proposed energy generation facilities that could be used to supply energy to pump the water back to the upper reservoir during non-peak energy demand periods. Therefore, we do not find that Eagle Crest targeted the project area due to the economic status of the surrounding rural community. Eagle Crest's site selection did not discriminate against the community in the project area due to its economic status. Additionally, earlier in this section, we conclude that the project would confer economic benefits on the surrounding communities, by bringing jobs and increased economic activity to the area.

We discuss key issues that may raise the environmental justice concerns throughout the final EIS. Specifically, we discuss contamination and drawdown effects on existing wells in section 3.3.2.2, *Water Resources, Environmental Effects*. We discuss air quality, noise, and vibration in section 3.3.8.2, *Air Quality and Noise, Environmental Effects*. Access and safety issues are discussed in section 3.3.5.2, *Recreation, Land Use, and Aesthetics, Environmental Effects*. The effects on local businesses are discussed in section 3.3.7.2, *Socioeconomics, Environmental Effects*.

3.3.8 Air Quality and Noise

3.3.8.1 Affected Environment

Air Quality

The CARB, part of the California EPA and one of the entities, along with local air districts, responsible for achieving and maintaining healthful air in California, reports that air pollution is one of the state's most serious problems (CARB, 2010). The reasons for the state's air quality problems include: (1) a large population (about 37 million and growing), which translates into a high number of vehicle miles traveled and associated vehicle emissions; (2) a geography with the most heavily populated areas of the state being valleys or basins surrounded by mountains; and (3) a climate of hot, stagnant summer air that traps air pollutants in heavily populated valleys and basins. Sources of air emissions in California include stationary sources (e.g., commercial facility operations), area-wide sources (e.g., fugitive dust, residential fireplaces), mobile sources

(e.g., on-road vehicles and trucks, aircraft, boats, trains), and natural sources (e.g., biogenic and geogenic hydrocarbons, natural windblown dust, wildfires).

State and National Air Quality Standards

To maintain acceptable ambient air quality and protect public health, both California and the federal government have adopted ambient air quality standards (AAQSs) for criteria or indicator air pollutants. An AAQS establishes the concentration above which the pollutant is known to cause adverse health effects on sensitive groups within the population, such as children and the elderly. The goal is for localized project effects not to cause or contribute to an exceedance of the standards. AAQSs are classified as either “primary” or “secondary” standards. Primary standards define levels of air quality, including an adequate margin of safety, necessary to protect the public health. National secondary AAQSs define levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. The criteria pollutants for which standards have been established are carbon monoxide, lead, ozone, nitrogen dioxide, particulate matter (PM₁₀ [particulate matter greater than 10 microns in diameter] and PM_{2.5} [particulate matter greater than 2.5 microns in diameter]), and sulfur dioxide. Brief descriptions for the four criteria pollutants of most relevance to the proposed project are provided below.

Carbon Monoxide

Carbon monoxide is a colorless, odorless gas that is directly emitted as a byproduct of combustion. The principal sources of carbon monoxide emissions are motor vehicles, and the highest concentrations of this gas occur under cold, stagnant weather conditions. Carbon monoxide is harmful because it is absorbed through the lungs into the blood stream and reduces the ability of the blood to transport oxygen. As a result, the blood supply to the heart, lungs, and other tissues is reduced, with potentially critical consequences for the sick and elderly.

Particulate Matter (PM₁₀ and PM_{2.5})

Particulate matter is a mixture of different substances, including metals, carbon, nitrates, sulfates, organic compounds, and complex mixtures such as diesel exhaust and soil. Particulate matter has been classified as either PM₁₀ or PM_{2.5} material. PM₁₀ particulates, which have an aerodynamic diameter of 10 microns or smaller, are referred to as “respirable” material because they are small enough to penetrate into inner regions of the lungs where they can be harmful to human health. PM_{2.5} particulate matter, which is even finer (aerodynamic diameter of 2.5 microns or smaller), can deposit deeper in the lungs when inhaled. Exposure to particulate matter aggravates respiratory illnesses and is

especially harmful to people with pre-existing heart and lung diseases. Particulate matter (both PM₁₀ and PM_{2.5}) can either be directly emitted (e.g., dust or soot) or formed in the atmosphere from precursor gaseous emissions, including nitrogen oxides, sulfur oxides and ammonia. Based on EPA estimates, the largest contributor to PM₁₀ levels nationwide is fugitive dust, which accounts for 89 percent of the total particulate matter. EPA also estimates that about 14 percent of fugitive dust is attributable to construction activities and 9 percent to re-suspension on paved roads.

Ozone

Ozone is a colorless, odorless gas that constitutes the main component of urban smog. Ozone is not directly emitted as a pollutant, but is formed when precursor hydrocarbon and nitrogen oxides emissions react photochemically in the presence of sunlight. Stagnant air or low wind speeds and warm temperatures provide optimum conditions for ozone formation. Ozone irritates the lungs and damages the respiratory system.

Sulfur Dioxide

Sulfur dioxide (SO₂) is a combustion product of sulfur or sulfur-containing fuels, such as coal and diesel. SO₂, which is also a precursor to the formation of atmospheric sulfate and particulate matter, contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain.

For most of the criteria air pollutants, California State standards are more stringent than federal standards because of inferences from different health effects studies and incorporation of a higher margin of safety to protect sensitive individuals. California and federal (i.e., EPA) AAQs for criteria pollutants are presented in table 25.

Under the federal Clean Air Act, each state must identify non-attainment areas that do not meet the National Ambient Air Quality Standards (NAAQS). For any non-attainment designation, a State Implementation Plan (SIP) is developed to define actions to be taken to achieve attainment of the applicable NAAQS. In summary:

- An attainment area is any area that meets the NAAQS,
- A non-attainment area is any area that does not meet the NAAQS, and
- A maintenance area is any area previously designated non-attainment that is in transition back to attainment.

Table 25. Selected California and federal ambient air quality standards (Source: CARB, 2010; EPA, 2010).

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone (O ₃)	1 hour	0.09 ppm (180 µg/m ³)	0.12 ppm (235 µg/m ³)	Same as primary standard
	8 hour	0.07 ppm	0.08 ppm (157 µg/m ³)	
Respirable particulates (PM ₁₀)	24 hour	50 µg/m ³	150 µg/m ³	Same as primary standard
	Annual mean	20 µg/m ³	50 µg/m ³	
Fine particulates (PM _{2.5})	24 hour	No standard	65 µg/m ³	Same as primary standard
	Annual mean	12 µg/m ³	15 µg/m ³	
Carbon monoxide (CO)	8 hour	9 ppm (10 mg/m ³)	9 ppm (10 mg/m ³)	None
	1 hour	20 µg/m ³ (23 mg/m ³)	35 µg/m ³ (40 mg/m ³)	
	1 hour	0.18 ppm (472 µg/m ³)	0.100 ppm	
Sulfur dioxide (SO ₂)	Annual mean	--	0.03 ppm (80 µg/m ³)	--
	24 hour	0.04 ppm (105 µg/m ³)	0.14 ppm (365 µg/m ³)	--
	3 hour	--	--	0.5ppm (1,300 µg/m ³)
	1 hour	0.25 ppm (655 µg/m ³)	--	--

As shown in table 26, the area surrounding the proposed project site is currently designated as attainment for all criteria pollutants subject to NAAQS, but is designated by CARB as nonattainment for ozone and PM₁₀ under the California AAQs.

Table 26. Project area designations in 2010 under NAAQS and California AAQS (Source: Eagle Crest, 2009a).

Designation by:	CO	PM₁₀	PM_{2.5}	O₃	NO₂	SO₂	Pb
NAAQS ^a	A	A	A	A	A	A	A
California AAQS ^b	U	N	U	N	A	A	A

Notes: A – attainment

CO – carbon monoxide

N – non-attainment

NO₂ – nitrogen dioxide

O₃ – ozone

Pb – lead

PM_{2.5} – fine particulate matter

PM₁₀ – respirable particulate matter

SO₂ – sulfur dioxide

U – unclassified (treated as attainment)

^a EPA (2010)

^b CARB (2010)

General Conformity is the federal process used to ensure that the air quality effects of federal actions not related to motor vehicle transportation plans are also considered in the air quality planning of nonattainment and maintenance areas. Because the area surrounding the proposed project site is currently designated as attainment/unclassified for all NAAQS, although it is nonattainment for the California AAQS for ozone and PM₁₀, General Conformity is not applicable and a General Conformity Determination is not required for the Eagle Mountain Project.

Prevention of Significant Deterioration (PSD) regulations were first promulgated by the EPA (40 CFR part 52) to prevent air quality degradation in those areas where criteria air pollutant concentrations are below (within) the ambient standards (i.e., attainment areas). Exceedance of a PSD trigger level requires a demonstration by pollutant dispersion modeling that the emissions will not interfere with the attainment or maintenance of any NAAQS at the point of maximum effect and would not cause an exceedance of a PSD increment.

South Coast Air Quality Management District

To better manage common air quality problems, California is divided into 15 air basins, each of which is associated with an Air Quality Management District (AQMD). The project site is located within the Mojave Desert Air Basin, which is within the jurisdiction of the SCAQMD. The SCAQMD acts as the primary reviewing agency for environmental documents addressing potential air quality impacts, and it develops regulations that must be consistent with, or more stringent than, federal and state air quality policies. The SCAQMD is responsible for developing attainment plans for the region for inclusion in California's SIP, as well as establishing and enforcing air pollution control rules and regulations. The attainment plans must demonstrate compliance with

federal and state AAQs, and must first be approved by CARB before inclusion into the SIP. The SCAQMD regulates, permits, and inspects stationary sources of air pollution, while the state is responsible for emission standards and controlling actual tailpipe emissions from motor vehicles. The relevant rules and regulations for the project follow:

- Rule 402—requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site, and
- Rule 403—requires use of best available technologies to reduce the amount of particulate matter (dust) entrained in ambient air as a result of anthropogenic (human-made, e.g. construction) activities.

Because the project site is in California, the potential effects on air quality are determined based on CEQA guidelines, SCAQMD thresholds for criteria pollutants, and other relevant considerations. These guidelines identify certain thresholds that may be pertinent in determining whether an effect is significant. Using these thresholds, the project would be examined to determine whether it would:

- Result in a cumulative increase in ambient concentrations or emissions of any criteria pollutant that is designated as in non-attainment for the project area under an applicable federal or state AAQS and emission thresholds,
- Create new sensitive receptors to be affected by substantial increases of pollutant concentrations, and
- Create objectionable odors affecting a substantial number of people.

With respect to criteria pollutants, the SCAQMD provides quantitative guidance regarding thresholds for both construction and operational activities. These thresholds, listed in pounds per day, are presented in table 27 for construction and operations.

Table 27. South Coast Air Quality Management District thresholds (pounds per day) (Source: SCAQMD, 2009).

Source	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	SO _x
Construction	75	100	550	150	55	150
Operation	55	55	550	150	55	150

Notes: CO – carbon monoxide

NO_x – nitrous oxides

PM_{2.5} – particulate matter greater than 2.5 microns in diameter

PM₁₀ – particulate matter greater than 10 microns in diameter

SO_x – sulfur oxide

VOC – volatile organic compounds

Noise

Noise (defined as unwanted sound) is emitted from many sources including airplanes, factories, railroads, power generation plants, and highway vehicles. The magnitude of noise is described by its sound pressure. Because the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, the decibel. Sound pressures described in decibels are called sound pressure levels.

To describe noise environments and to assess effects of noise on sensitive areas, a frequency weighting measure called A-weighting, which simulates human perception, is commonly used. It has been found that this measure of sound levels best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that compare the wide range of sound intensities to those that the human ear is most sensitive to. Table 28 identifies dBA levels of typical noise environments.

Table 28. A-weighted decibel scale (dBA) sound levels of typical noise environments
(Source: FICON, 1992, as modified by staff).

dBA	Overall Level	Noise Environment
120	Uncomfortably Loud (32 times as loud as 70 dBA)	Military jet takeoff at 50 feet
100	Very loud (8 times as loud as 70 dBA)	Jet flyover at 1,000 feet
80	Loud (2 times as loud as 70 dBA)	Propeller plane flyover at 1,000 feet; diesel truck 40 mph at 50 feet
70	Moderately loud	Freeway at 50 feet from pavement edge; vacuum cleaner (indoor)
60	Relatively quiet (1/2 as loud as 70 dBA)	Air condition unit at 10 feet; dishwasher at 10 feet (indoor)
50	Quiet (1/4 as loud as 70 dBA)	Large transformers; small private office (indoor)
40	Very quiet (1/8 as loud as 70 dBA)	Bird calls; lowest limit of urban ambient sound
10	Extremely quiet (1/64 as loud as 70 dBA)	Just audible
0	Threshold of hearing	

Notes: dBA – A-weighted decibel scale

mph – miles per hour

Several time-averaged scales represent noise environments and consequences of human activities. The most commonly used noise descriptors are as follows:

- Leq—the equivalent A-weighted sound level over a given period;
- Ldn—average day–night 24-hour average sound level; and
- Lmax—the maximum sound level measured over the measurement period.

Regulatory Setting

Most local jurisdictions have noise exposure standards designed to ensure that noise does not excessively affect the quality of life of citizens. Noise is regulated in the proposed project area through general plan policies and noise ordinances. The Riverside County General Plan (Riverside County, 2003, as cited in Eagle Crest, 2009a) identifies policies and standards intended to direct planning associated with the effects of new developments, while the county’s noise ordinances establish standards and procedures for addressing specific noise sources.

For the state of California, noise intensity is also discussed in terms of Community Noise Equivalent Level, which describes a weighted average noise level that increases the relative significance of evening and nighttime noise. The Community Noise Equivalent Level descriptor is used to evaluate community noise levels, which includes a 5 and 10 dBA penalty added to evening (7:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) sound levels, respectively, in consideration of people’s increased sensitivity to noise during those periods.

Riverside County General Plan—Riverside County identifies land use compatibility noise levels to ensure acceptable noise environments for each land use within unincorporated Riverside County. As part of the general plan, the noise element also identifies noise compatibility, noise mitigation strategy, stationary noise, and temporary construction policies that may be applicable to the proposed project.

Riverside County Noise Ordinance—Riverside County Ordinance 847, Regulating Noise, identifies general noise level standards that are not to be exceeded within the county (Riverside County, 2009, as cited in Eagle Crest, 2009a). For example, the maximum noise level standards that would be applicable to sensitive receptor locations in the project vicinity (i.e., rural residences) are 55 dBA from 7:00 a.m. to 10:00 p.m. and 45 dBA from 10:00 p.m. to 7:00 a.m. The ordinance also regulates noise from the operation of power tools or equipment and motor vehicles.

Ambient Noise Levels

The general project area is remote, with relatively low noise levels that are estimated to average between 35 and 45 dBA. The main noise source in the area is vehicle noise on nearby roads, including Interstate 10, Eagle Mountain Road, and Kaiser

Road. Vehicle noises can range up to 80 dBA, depending on the distance of the receptor from the source.

Ambient Leq noise measurement data were last collected in the project area for the review of the proposed Eagle Mountain landfill project (Riverside County, 1996, as cited in Eagle Crest, 2009a). Although these data are more than 13 years old, the ambient conditions in the study area are largely the same, with the exception that at the time of the measurements, a state-run correctional facility used some of the buildings at the Eagle Mountain town site. That correctional facility has since relocated from the site.

Ambient Leq noise levels at the Eagle Mountain town site were measured to be between 38 and 63 dBA, depending on the distance of the measurement locations from Kaiser Road. Now that the correctional facility is not located at the site, existing average ambient noise levels likely would be closer to the lower level of the measured range. Ambient Leq noise levels in the vicinity of the communities of Lake Tamarisk and Desert Center were measured to be moderately higher than those in the immediate project area, ranging between 54 and 60 dBA and 66 and 70 dBA, respectively. The ambient Leq noise level near Interstate 10 at Kaiser Road was measured to be 73 dBA.

Sensitive Receptors

For noise analyses, sensitive receptors are generally defined as land uses that are sensitive to noise, such as residential areas, schools, convalescent and acute care hospitals, some parks and recreational areas, and churches and other religious facilities.

Even though the Eagle Mountain town site is largely abandoned, according to Kaiser, a few occupied buildings and a school remain in this area. Also, private residences are located a few miles to the south-southeast and southeast of the site, along Eagle Mountain Road/Phone Line Road and Kaiser Road, respectively. However, these sensitive receptors are within about 200 feet of the proposed location of the electric transmission line route along Eagle Mountain Road and the water supply line route that would be along Kaiser Road.

In addition, the general project vicinity is located about 1.5 miles from the closest JTNP boundary.

3.3.8.2 Environmental Effects

Air Quality

For the purposes of air quality analyses, sensitive areas are generally defined as land uses where the public has continuous access and with population concentrations that would be particularly susceptible to disturbance from dust and air pollutant concentrations associated with project construction and/or operation. These sites generally include schools, day-care centers, libraries, hospitals, residential-care centers, parks, and churches. Some locations are considered more sensitive to air pollutants than

others, including places with concerns of pre-existing health issues, proximity to emissions sources, or duration of exposure to air pollutants.

In addition to the mostly abandoned Eagle Mountain town site, the two small communities of Lake Tamarisk and Desert Center are located about 9 and 10 miles southeast of the proposed reservoirs, respectively. The proposed site is also about 1.5 miles from the southeastern boundary of JTNP at its nearest point and about 30 miles from the more developed sections of JTNP. National Parks and wilderness areas are designated as Class I areas, and afforded protection through the federal PSD program. Visibility and air concentrations due to fugitive dust emissions during construction are the main issue for air quality.

Effects of Construction on Air Quality

Air emissions associated with construction activities would be temporary and variable, depending on project location, duration, and level of activity. These emissions would be predominantly associated with the exhaust generated by operating construction equipment, but could also be attributed to fugitive dust (PM_{2.5} and PM₁₀) produced by materials staging, demolition, and earthworks activities, as well as concrete processing operations.

In its license application, Eagle Crest proposes measures derived from South Coast AQMD Rule 403 to limit dust sources from grading, trenching, wind erosion, and truck filling/dumping at the site (see section 2.2.4, *Proposed Environmental Measures*, for a description of proposed Measures AQ-1 through AQ-12). In addition, Eagle Crest proposes measures to reduce effects from engine exhaust, including developing and implementing a transportation management plan, using 2002 and newer equipment and emission control devices for older equipment to reduce exhaust from diesel equipment, and using electrical drops from an existing electrical service in lieu of installing temporary electrical generators. Eagle Crest also proposes to work collaboratively on a cost-share basis with the Park Service to complete a 2-year air monitoring study.

Our Analysis

Two categories of construction equipment would generally be used at the site:

- On-road trucks and vehicles for the transport and delivery of supplies, materials, and equipment to and from the site, as well as the employee vehicles; and
- Non-road equipment operated exclusively on site for construction activities such as paving, utility installation, site clearing and fill operations, earth moving, earth loading and unloading, structure installation, and tunnel boring.

Eagle Crest developed activity levels and vehicle assignments for non-road and on-road construction vehicles based on requirements and projected construction schedules. Non-road exhaust emissions factors were calculated using the current version

of the CARB OFFROAD2007 model, while on-road emissions factors were computed using county-specific data processed by the CARB EMFAC2007 model. Based on the construction equipment assignments, usage schedules and engine exhaust factors determined from the models described above, Eagle Crest estimated air emissions.

Eagle Crest also estimated fugitive dust PM emissions from soil disturbance, wind erosion of stockpiles, traffic on unpaved surfaces, blasting, and demolition using the SCAQMD's CEQA Air Quality Handbook, EPA's Compilation of Air Pollution Emissions Factors (i.e., AP-42), and other accepted guidance. Eagle Crest applied a 75 percent control efficiency pertaining to fugitive dust and relevant emissions based on implementation of the proposed mitigation techniques.

Table 29 provides the annual construction-related emissions associated with the proposed project identified by project year and pollutant type. Based on the current construction schedule, annual construction-related emissions would be highest in 2013 or 2014, depending upon the pollutant. Table 29 also shows that the proposed project would represent a very small percentage (less than 0.06 percent) of the forecasted annual emissions within the Mojave Desert Air Basin.

Table 29. Estimated annual construction emissions (tons) (Source: Eagle Crest, 2010a).

Year	CO	VOC	NO _x	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	N ₂ O	CH ₄
2012	59.0	7.46	54	2.83	2.54	0.08	7,998	0.05	0.68
2013	57.8	7.86	57	2.95	2.64	0.09	9,021	0.05	0.71
2014	60.2	7.67	51	2.79	2.49	0.09	9,297	0.07	0.72
2015	15.8	1.66	10	0.61	0.54	0.025	1,931	0.03	0.15
Maximum	60.2	7.86	57	2.95	2.64	0.09	9,297	0.07	0.72
Percent of Mojave Desert Air Basin regional emissions	0.05	0.02	0.06	0.004	0.02	0.003	NA	NA	NA

Notes: CH₄ – methane

CO – carbon monoxide

CO₂ – carbon dioxide

NA – not available

N₂O – nitrous oxide

NO_x – nitrogen oxides

PM_{2.5} – particulate matter greater than 2.5 microns in diameter

PM₁₀ – particulate matter greater than 10 microns in diameter

SO₂ – sulfur dioxide

VOC – volatile organic compound

Table 30 provides the estimated daily construction-related emissions associated with the proposed project before applying any of the mitigation measures proposed by Eagle Crest. These estimated emissions are less than the SCAQMD CEQA thresholds for all pollutants except NO_x, where the estimated emissions exceed the threshold in 3 out of 4 years. Eagle Crest proposes Measures AQ-1 through AQ-12, development and implementation of a transportation management plan, use of 2002 and newer equipment, use of emission controls on older equipment, and use of electrical drops in place of temporary generators to reduce construction-related emissions. Levels of NO_x might still exceed CEQA standards, but the monitoring during construction proposed by Eagle Crest would determine whether standards are exceeded and whether additional measures are needed.

Table 30. Daily construction emissions (pounds) (Source: Eagle Crest, 2010a).

Year	CO	VOC	NO _x	PM ₁₀	PM _{2.5}	SO ₂
2012	454	57	417	21.7	19.6	0.62
2013	444	60	436	22.7	20.3	0.71
2014	464	59	392	21.4	19.1	0.73
2015	121	13	74	4.7	4.2	0.16
Maximum	464	60	436	22.7	20.3	0.73
CEQA threshold	550	75	100	150	55	150
Exceed CEQA	No	No	Yes	No	No	No

Notes: CO – carbon monoxide

NO_x – nitrous oxides

PM₁₀ – particulate matter greater than 10 microns in diameter

PM_{2.5} – particulate matter greater than 2.5 microns in diameter

SO₂ – sulfur dioxide

VOC – volatile organic compound

Air emissions related to the off-highway trucking movement of nearly 3 million cubic yards of onsite materials were included in the above emission calculations. Eagle Crest anticipates that there is an extensive stock of mine tailings available on site that Eagle Crest plans to use for facility construction. In the unlikely event that these materials are not usable and equivalent materials must be brought from off-site sources,

the annual construction emissions would increase by about 1, 10, 17, and 1 tons of reactive organic gases, CO, NO_x, and PM₁₀, respectively, during the worst case year, and the daily construction emissions would increase by about 7, 75, 138, and 8 pounds per day, respectively. This would increase the daily construction emissions, but not to a level that would exceed the CEQA threshold (except for NO_x). Thus, the use of off-site fill material instead of onsite fill material would not change the overall effects related to the proposed project and air quality.

Eagle Crest also proposes to work collaboratively on a cost-share basis with the Park Service to complete a 2-year air monitoring study. As requested by the Park Service, the monitoring results would be used to adjust the construction workload if any exceedances are observed.

Effects of Operations on Air Quality

Project operation would have minimal direct effects on air quality. The indirect effects could be beneficial if power from the pumped storage project replaces or supplements fossil-fueled peaking generation facilities.

Our Analysis

During operations, air pollutant emissions associated with project maintenance activities would be minimal, and according to Eagle Crest, would not exceed SCAQMD thresholds for operation. Table 31 provides the estimated operation-related annual emissions associated with maintenance of the proposed project.

Table 31. Annual operational emissions (tons) (Source: Eagle Crest, 2009a).

CO	VOC	NO_x	PM₁₀	PM_{2.5}	SO₂	CO₂	N₂O	CH₄
0.57	0.01	0.05	0.01	0.01	0.00	102	0.00	0.01

Notes: CO – carbon monoxide

VOC – volatile organic compounds

NO_x – nitrous oxides

PM₁₀ – particulate matter greater than 10 microns in diameter

PM_{2.5} – particulate matter greater than 2.5 microns in diameter

SO₂ – sulfur dioxide

CO₂ – carbon dioxide

N₂O – nitrous oxide

CH₄ – methane

The maximum energy requirement to refill the proposed upper reservoir would be about 1,600 MW, generally consumed during off-peak periods. Eagle Crest states that this energy would normally be provided by wind (typically with excess generation during

nighttime conditions) and solar facilities during off-peak hours (generally on weekend days) and by general base-load electrical generation during the nighttime hours. In this manner, the project would act like a storage system for the energy generated during the off-peak hours. During peak energy demand periods, about 1,300 MW of generation would occur. In this manner, the project would eliminate the need for up to 1,300 MW of simple-cycle natural gas (fossil-fueled) peaking facilities during peak periods, and decrease emissions associated with the fossil-fueled facilities.

Table 32 provides overall emission of CO₂, comparing power generation and pump-back power. The pump-back power that would be required would be greater than the power that would be generated by the facility, however, due to the timing and source of power from which pump-back power (generally from plants with low air emissions) is derived, and the displacement of other peak power sources (generally peaker plants with higher emissions). Overall, emissions of CO₂ would be reduced by the overall system operation. Table 32 compares two scenarios for maximum and minimum displacement scenarios. The difference in the scenarios is that pump-back power is assumed to be generated by renewable sources in the maximum displacement scenarios and by combined-cycle power plants in the minimum displacement scenarios. This table shows that overall emissions of CO₂ would be reduced by the overall system operation.

Table 32. Annual electrical generation offset of CO₂ emissions
(Source: State Water Board, 2010).

Pump-back power used	Renewable sources	GWh/year	2,883
		Annual CO ₂ (metric tons)	0
	Combined cycle	GWh/year	2883
		Annual CO ₂ (metric tons)	1,065,796
Generation Displaced	Simple cycle	GWh/year	2,278
		Annual CO ₂ (metric tons)	1,115,751

Noise

Our analysis of potential noise effects that could result from the short-term construction and long-term operation of the proposed project is discussed below. The noise analysis considers Riverside County noise regulations and ordinances and Federal Transit Administration guidelines.

Effects of Project Construction on Noise Levels

Construction of the project would have a temporary effect on ambient noise levels. Although a few intermittent activities such as rock drilling or pavement breaking would be louder, engine noise would be the dominant source of noise from most construction equipment.

Eagle Crest proposes to comply with the County of Riverside's General Plan and its applicable noise ordinance codes during construction (Measure NOI-1). Eagle Crest also plans to equip all construction equipment with properly operating and maintained noise mufflers and intake silencers, consistent with manufacturers' standards (Measure NOI-2).

Our Analysis

Aerial photographs of the region show that there limited sensitive land uses, such as residences, schools/churches, or parks located in the general project vicinity, which includes the proposed Eagle Mountain upper and lower reservoir sites, the proposed pressure and tailrace tunnel locations, and the proposed powerhouse, switchyard, and reverse osmosis treatment sites. However, there are a few remaining occupied structures and a school at the Eagle Mountain town site.

The majority of the portion of the central project area where construction would occur (upper and lower reservoir sites, the proposed pressure and tailrace tunnel locations, and the proposed powerhouse, switchyard, and reverse osmosis treatment sites) lies largely within the mined lands where there are no sensitive land uses, such as residences, schools/churches, or parks. These sites are in or beneath mountainous terrain and mine tailings and are about 1.5 to 4 miles from the nearest sensitive receptors such as the few occupied residences and the school at the Eagle Mountain town site and the rural residences along Kaiser Road and Eagle Mountain Road. The central project area is about 1.5 miles from the closest boundary of JTNP. As noted earlier in this section, sensitive receptors would be within about 200 feet of the proposed locations of the electric transmission line along Eagle Mountain Road and the water supply line along Kaiser Road.

Based on the assumed noise levels at 50 feet from the construction equipment, a standard acoustical equation was used to estimate the attenuation of noise based on the distance from the construction site to the nearest JTNP boundary and the nearest sensitive receptors. The equation uses a noise attenuation rate of about 7.5 dBA per doubling of distance to account for the absorption of noise waves due to ground surfaces such as soft dirt and bushes (Caltrans, 1998, as cited in Eagle Crest, 2009a). Table 33 shows estimated construction noise levels that would affect people at the nearest sensitive land uses to the proposed reservoir sites and the proposed pipeline/transmission line routes. These estimated noise levels represent the worst-case scenario because the estimates do not account for noise attenuation due to the presence of natural sound barriers. Noise levels associated with construction activities at the reservoir sites would be expected to be at least 5 to 10 dBA less at the nearest sensitive receptors because most of the work

would be completed at the bottom of the proposed reservoir sites where the line of sight between the construction activities and the receptors would be blocked.

Table 33. Minimum distances and L_{\max} noise levels (in dBA) at sensitive land uses (Source: State Water Board, 2010).

Project Component	Closest Distance to the Sensitive Land Use	L_{\max} at 50 feet (rock drill/dump truck)	L_{\max} at Closest Residence (rock drill/dump truck)
Reservoir sites	4 miles (residences)	98/88	32/22
Reservoir sites	2 miles (JTNP)	98/88	43/33
Pipeline/transmission line	200 feet (residences)	98/88	83/73

Notes: JNTP — Joshua Tree National Park and wilderness area

L_{\max} — the maximum sound level measured over the measurement period

As indicated in table 33, maximum estimated construction noise from the vicinity of the reservoir sites at the nearest residences would be 32 dBA during rock drilling and 22 dBA for dump trucks and other construction activities. These noise levels would likely not be audible at the nearby residences. The same construction activities would generate noise levels at the boundary of JTNP that would be up to 43 dBA during rock drilling and 33 dBA during other construction activities. However, rock drilling, if necessary, would generate loud noises only during early stages of the construction and the noise would be substantially attenuated when excavation for the project tunnels and other facilities proceeds deep into the ground. Thus, rock drilling activities could be audible at the boundary of JTNP, but the effect would be temporary and not substantial.

Construction of the proposed tunnels and powerhouse facilities would occur underground. Therefore, noise effects associated with construction of these facilities would be limited. Maximum construction noise at the nearest sensitive receptors to the transmission line and water pipeline would be adverse; however, it is anticipated that construction of the facilities would proceed in a linear fashion, and construction noise effects at any one location along the pipeline or transmission line route would last for no more than several weeks.

Construction of the project would also create increased traffic on local roads. Increased traffic would be generated from the movement of workers, materials, and equipment to the site. The primary routes used to access the project site would be Interstate 10 and Kaiser Road, and workers coming to the site would use these routes. Given the existing low volumes of traffic levels along Kaiser Road, construction traffic would result in an increase in noise levels at residences along the road, an adverse

temporary effect. Based on aerial photographs, about 20 residences would be affected by the increased traffic noise along Kaiser Road.

Compliance with the applicable County of Riverside noise ordinance codes during construction would minimize the effects of noise levels during construction. Eagle Crest's other proposed measures would lower the noise level during construction by equipping all construction equipment with properly operating and maintained noise mufflers and intake silencers, consistent with manufacturers' standards.

Effects of Project Operations on Noise Levels

Normal operation of the proposed project would result in a minimal increase in road traffic but would not substantially increase ambient noise levels along Kaiser Road. The proposed underground powerhouse would not affect above-ground noise levels. Noise could be generated from the transmission lines in some situations. Eagle Crest has not proposed any measures to limit noise levels during project operation.

Our Analysis

During project operation, the increase in traffic along the access roads north of Interstate 10 would be minimal due to the low number of employees expected to be employed at the site. One exception would be related to salt removal operations from the evaporation and solidification ponds. Removal of the expected salt volume from onsite locations to an unspecified and likely off-site location would require about 280 truck trips per year if the removal were done on an annual basis. Because Eagle Crest proposes to implement the salt removal process at 10-year intervals, resulting in almost 3,000 truck trips in a short period, the truck noise related to this operation would be noticeable.

Under wet weather conditions, high-tension transmission lines may generate audible noises known as corona discharge. The degree or intensity of the corona discharge and the resulting audible noise (normally a low-level hissing or crackling noise) are affected by humidity, air density, wind, and water in the form of rain, drizzle, and fog. Humidity levels increase the conductivity of the air and therefore increase the intensity of the discharge. Also, irregularities on the conductor surface, such as nicks or sharp points and airborne contaminants, can increase the corona activity. The higher voltages at which modern transmission lines operate have increased the noise problem, and the power industry designs, constructs, and maintains transmission lines so that during dry conditions they would operate below the corona-inception voltage. This means that the proposed line would generate a minimal amount of corona-related noise during the vast majority of the time in the very dry desert location of the proposed transmission line. However, during rare foul weather conditions, corona discharges could be produced by water droplets and fog.

Eagle Crest estimates that the corona noise at the edge of the proposed 500-kV transmission line ROW (i.e., 100 feet from the centerline of the transmission line) would range from 45 to 50 dBA. At 200 feet from the transmission line, this would equate to a

noise level range of about 37 to 43 dBA. This low-level noise would be noticeable only close to the line during the very rare wet weather conditions.

3.3.8.3 Cumulative Effects

The air quality cumulative effects analysis considers whether the project, in combination with other reasonably foreseeable local and regional developments, would create a significant cumulative effect. The other potential developments include several solar projects and the proposed Eagle Mountain landfill.

In general, the cumulative air quality analysis can consider applicable planning documents that guide development at, or in the vicinity of, the project and within the region; under CEQA this is considered a plan-based approach. The cumulative contribution of the proposed project to criteria pollutants is considered in the ongoing planning by the SCAQMD to meet the state and federal regulatory AAQs into the future. This planning is based on inventories of emissions anticipated from development in accordance with each of the county general plans within the air basin.

Given the progress and locations of other projects, Eagle Crest concluded that construction of the solar projects would be removed from cumulative actions due to their locations and distances from the proposed project; while construction of the Eagle Mountain landfill project would also be removed due to its time schedule (construction would probably not occur simultaneously with construction of the proposed project).

Because construction of the proposed project would result in a temporarily significant construction-related effect for NO_x in construction years 2013 and 2014, the proposed project would also be considered to have a significant cumulative air quality impact for NO_x, as a precursor to ozone formation, in those years. However, because of the temporary nature of construction activities and implementation of Eagle Crest's proposed measures, the severity and frequency of these effects would be limited. Furthermore, Eagle Crest's proposal to work collaboratively on a cost-share basis with the Park Service to complete a 2-year air monitoring study would provide data to adjust the construction workload if any exceedances are observed.

Based on the location and timing of the project, the CO, PM₁₀, and PM_{2.5} effects are not likely to be cumulatively significant.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Eagle Mountain Project would not be constructed. There would be no changes to the physical, biological, or cultural resources of the area and electrical generation from the project would not occur.